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THE

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VOL. I.—11TH YEAR. SYDNEY: SATURDAY, JUNE 14, 1924. No. 24.

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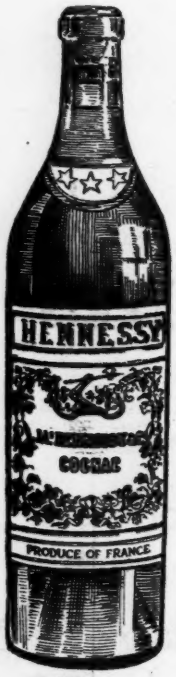

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THE SIGNIFICANCE OF THE DOUBLE INNERVATION OF VOLUNTARY MUSCLE ILLUSTRATED BY REFERENCE TO THE MAINTENANCE OF THE POSTURE OF THE WING.[1]

By JOHN I. HUNTER, M.D., Ch.M.,
Challis Professor of Anatomy, University of Sydney, Honorary Consulting Neurologist to the Lewisham Hospital, Sydney.

DR. ROYLE has demonstrated to you this afternoon his experimental work upon animals concerning the influence of the sympathetic innervation of voluntary muscles and the application of the results so obtained to the treatment of spastic paralysis. It is the purpose of this address to show how this work enables us to correlate for the first time with a sufficient measure of confidence two lines of anatomical and physiological research which have been pursued in various laboratories throughout the world, and chiefly have remained as independent observations.

Researches upon the Innervation of Voluntary Muscle.

The first line of research that I shall deal with, concerns the significance of the presence of two types of motor nerve endings in voluntary muscle. In 1879 Tchiriev (compare Kulchitsky[1]) observed that in addition to the ordinary motor end-plates other terminations (*terminaisons en grappes*) were to be seen in preparations of voluntary muscle. He demonstrated the important fact that the latter terminations were always associated with a non-medullated fibre. The first type on the other hand represents the ending of a medullated fibre, the medullary sheath being continued as far as the sarcolemma at the site of termination. But Tchiriev believed that all stages of transition existed between the two types of endings and that the non-medullated fibres and their end-plates became converted into medullated fibres with the usual form of motor terminations when such terminations attained full maturity. Experimental investigation has proved that this interpretation is incorrect and that the significance of the difference in structure of the two kinds of fibres and of their end-plates, is that the medullated fibres are cerebro-spinal fibres. These end in the large motor end-plates (Type I., of Kulchitsky, see Figure I.). The non-medullated fibres with their characteristic terminations (Type II., of Kulchitsky, see Figure II.) are post-ganglionic fibres of the sympathetic system.

Boeke's work[2] is conclusive on this point and has been confirmed by the experimental work of

[1] Read at the Annual Meeting of the North-Eastern Medical Association, Lismore, New South Wales, on April 12, 1924.

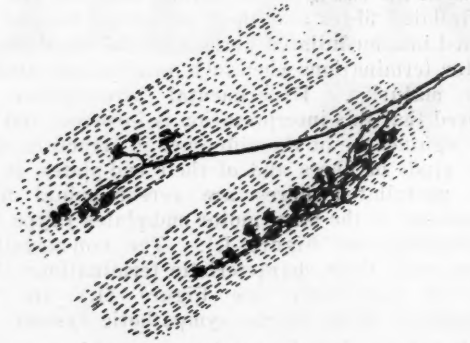
Motor plate (type I). *a*—axis cylinder, *b*—collateral. Python.

FIGURE I.—(After Kulchitsky.)

Boeke and Dusser de Barenne[3] and of Agduhr[4] in 1919. It has been shown that the medullated fibres and their end-plates degenerate after section, leaving the non-medullated fibres and their terminations intact; on the other hand, the medullated fibres are unharmed while the non-medullated fibres disappear on removal of the sympathetic ganglia. Adrian[5] and Wilson[6] accept this position in recent reviews of the subject. Adrian says: "It must be taken that voluntary muscle has a double nerve-supply composed of medullated fibres from the anterior horn of the cord and of non-medullated fibres from the sympathetic ganglia."

Researches upon the Activity of Muscle.

The second line of investigation of which I wish to speak, concerns the phenomena related to muscle activity. In 1896 Sherrington[7] presented to the Royal Society of London an epoch-making paper entitled "Cataleptoid Reflexes in the Monkey." In this paper he described a phenomenon of muscle activity seen subsequent to the careful removal of the cerebral hemispheres in that animal. He recorded the fact that stimulation of a finger of one of the monkey's hands led to an extensive reflex movement of the entire upper limb and he goes on to say that "the most striking feature of the reflexes is that when the actual movement has been accomplished, the contraction of the muscles employed in it does not cease or become superseded by the action of another group, but is continued even for ten and twenty minutes at a time."



Plates of type II, large and small. Python.

FIGURE II.—(After Kulchitsky.)

Sherrington[8] dealt with the reactions of the decerebrate animal in detail in 1909. He showed in this paper that the extensor muscle of the knee along with other anti-gravity muscles, exhibited a plasticity which enabled the extensor to maintain the leg in any degree of flexion upon the thigh when passively moved to such a position ("lengthening reaction"). Conversely, approximation of the points of origin and insertion by passive extension of the flexed knee led to a maintenance of the new position with the muscle "at a new and shortened tonic length" (*opere citato*, page 117). This reaction is the "shortening reaction." This property of the muscle which resembles that of a plastic body enabling it to remain in a new position after deformation, Sherrington called plastic tonus.

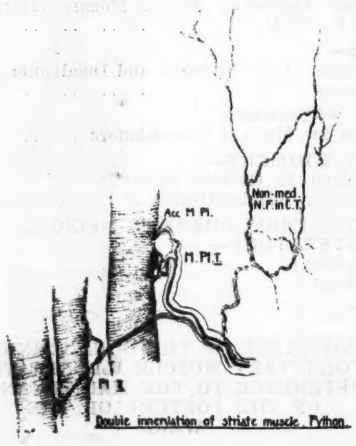


FIGURE III.—(After Kulchitsky.)

Sherrington showed that in the deafferented preparation, *id est* after severance of the posterior nerve roots of the segments concerned in the innervation of the extensor muscle, plastic tone disappeared. The shortening and lengthening reactions could not be elicited on this side, while the intact side exhibited the reactions characteristic of the decerebrate condition. Moreover, reflex contraction of the deafferented muscle differs markedly from that on the normal side. On the normal side reflex contraction continues long after the actual external stimulus is at an end. The reflex contraction of the deafferented specimen caused by stimulation of the contra-lateral popliteal nerve ceases suddenly with the cessation of the stimulus (see Figure IV.). One result of this is that a series of touches on the skin of the perineal region produces on the normal side a maintained effect, while the deafferented side exhibits a coarsely clonic effect (*loco citato*, page 132, see Figure V.). Sherrington concludes that "an obvious inference from these comparisons is that when under decerebrate rigidity, the normal extensor muscle, *id est* with

its intrinsic afferents intact, is thrown into reflex contraction by stimulation of other efferent nerves than its own intrinsic afferents, the contraction thus excited in it induces a 'shortening reaction' and that the maintenance of the contraction after the application of the extrinsic stimulus has ceased is referable to the 'shortening reaction' for which the intrinsic afferents of the muscle itself are responsible. In other words, in the muscle with its afferent nerve intact a proprio-ceptive autogenous reflex adds itself to reflexes caused by extrinsic afferents. In the deafferented muscle, the proprioceptive autogenous reflex is impossible, because the intrinsic afferents have been severed; hence the want of maintenance of the reflex effect and the want of fusion of the reflex effects of serial stimuli repeated at slow intervals" (*loco citato*, page 133). In addition to the rapid wane of individual reflex reactions of the deafferented preparation the muscle fatigues easily, leading to the disappearance of reflex contractions after stimulation for a minute or a minute and a half, while the normal side shows very little decline in amplitude over a period of five to ten minutes (*loco citato*, page 139).

Sherrington concludes his paper by marshalling the facts which point to the reflex character of the lengthening and shortening reactions. He believes that the effects are not only dependent on the intactness of a reflex arc, but also that a reflex inhibition and reflex contraction occur respectively in these reactions.

I cannot leave my summary of this paper of Sherrington without pointing to another important observation made in it. In order to estimate the relative intensity of the tonus when it keeps the muscle in the shortened state (knee extended) and in the lengthened state (knee flexed) respectively, he observed the weights which the tonus could support in the two positions. The difference proved to be very small, *exempli gratia* 46.5 grammes caused flexion with the knee at 105° and 47 grammes with the knee at 65°. The difference in length of the muscle fibres in two such positions may, however, be in the cat as much as twenty-four millimetres.

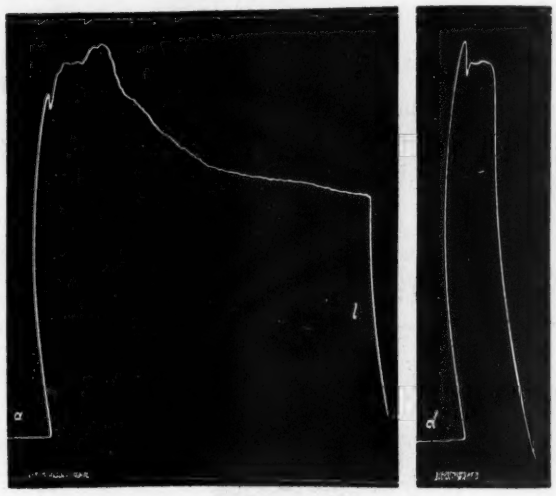


FIGURE IV.
Isolated vasto-crureus (cat); crossed extension reflex excited by faradization of the opposite popliteal nerve, *a* expressed by the muscle with normal afferent nerve fibres, *d* by the muscle with its afferent nerve fibres destroyed one hundred days previously. Reflex *a* was purposely cut short at *l*. (After Sherrington).

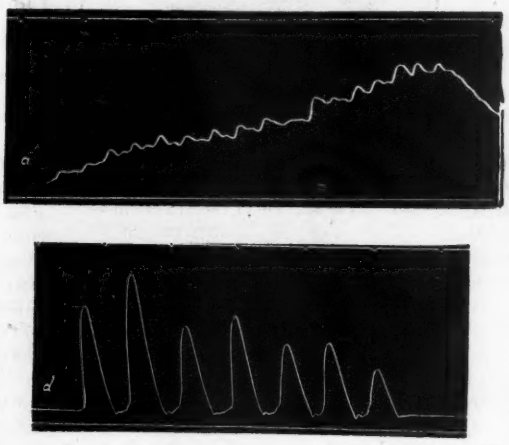


FIGURE V.
Isolated vasto-crureus (cat); perineal reflex excited by a series of touches on the skin, *a* expressed by the normal muscle, *d* by the deafferented muscle. (After Sherrington).

Sherrington then pointed out that this phenomenon was similar to the phenomena exhibited by unstriped muscle as described by V. Uexküll,[9] *videlicet* that after stretching the muscle does not return to its original length, being longer than before although it is again loaded only with its own weight. Sherrington says: "These words I find quite applicable to the tonic preparation of the vasto-crureus muscle of cat and dog. They practically describe the lengthening reaction of that preparation" (*loco citato*, page 145). He also refers to the demonstration by Mosso and Pellacani[10] that the urinary bladder with the same internal pressure may contain greatly different quantities of fluid. He quotes Grützner[11] who says: "I believe even striped muscle exhibits in this respect (*id est* the divergence between isotonic and isometric contractions) a certain analogy with unstriped."

In 1915, Sherrington[12] developed this theme in an illuminating article in *Brain* entitled "Postural Activity of Muscle and Nerve." He dealt with the subject under the three main headings of "Skeletal Muscle," "Visceral Muscle" and "Muscles of the Circulatory System." In regard to skeletal muscle, he points out that tonus is postural contraction. By reason of the lengthening and shortening reactions skeletal muscle allows a latitude of pose which is familiar to natural attitudes. "The postural reflex

contraction is plastic in this sense, hence the term plastic tonus has been applied to it. The skeletal muscle in this form of reflex contraction can quite readily adjust itself to different lengths while counteracting one and the same load" (*loco citato*, page 200). These reactions depend upon the intactness of proprio-ceptive reflex arcs and are present when the nerve centres are operating for the maintenance of posture.

In regard to visceral muscle Sherrington contrasts the reactions of the living and the dead bladder. Mosso and Pellacani[10] showed that the living bladder assumes postures suited to the volume of its contents. When the quantity of fluid in the bladder of a small dog is increased from ten cubic centimetres to ninety cubic centimetres, the pressure exerted is the same, *videlicet* ten centimetres of water. But "the dead bladder has no property such that when its radius is doubled the wall-tension is hardly increased" (*loco citato*, page 217). This function which is exhibited by the living bladder is comparable to the lengthening and shortening reaction of skeletal muscle. Sherrington says: "Therefore, we may apply the term 'posture' to this property of the bladder by virtue of which it solves the problem of acting as a reservoir for quantities of fluid of very varying volume from one occasion to another without allowing intravesical pressure to attain the reflex stimulus threshold height with one particular fluid-quantity only."

In the case of the fundus of the stomach a similar postural reaction can be seen. This power to adjust the postural contraction of the fundal portion to increased or diminished volumes of contents without much change of pressure, though present in the excised organ, is less active and ample than when the stomach is *in situ*.

In regard to circulatory muscle Sherrington reviews the evidence of Fano,[13] Botazzi[14] and Porter[15] to show that independently of the beat contraction a state of posture exists in the case of the heart; the auricles are comparable to the fundus of the stomach. In regard to the arteries the beat contraction is not prominent as in the heart and posture is very much in evidence. Freshly excised arteries have been shown to exhibit different diameters under almost the same wall tension (compare Sherrington, *loco citato*, page 224). It is probable that these reactions are more ample in living arteries. Krogh's observations[16] upon capillaries support this view. When the sympathetic ganglia are excised so that the contractile cells of Rouget are removed from the influence of their sympathetic nerve supply, dilatation occurs. When after a considerable time tone is regained, its regulation is very imperfect. States of strong contraction alternate with complete relaxation. In these vessels at least the maintenance of posture is the result of the activity of a neuro-muscular mechanism and is only completely exhibited when this mechanism is intact. We may conclude, therefore, that postural activities are exhibited by skeletal, visceral and circulatory muscle and that this activity attains its full development when the muscle is under the influence of its nerve supply.

FIGURE VI.
Normal frog (*R. esculenta*). Section of the seventh, eight and ninth *rami communicantes* on the right side; photograph taken on the following day to show the attitude of the animal three minutes after having made a jump. (After Langelaan.)

Correlation of the Two Lines of Research.

In previous papers, I have pointed out[17] that Royle's experiments[18] show that removal of the sympathetic nerve supply to voluntary muscle abolishes plastic tonus. This occurs in normal, spinal and decerebrate animals. If this is so, it can be deduced that the function of the sympathetic innervation of voluntary muscle is to maintain posture once assumed by fixing the muscle fibres at their new length. In this way it is responsible for the lengthening and shortening reactions. Compared with tetanic contraction the maintenance of posture by the sympathetic system, as in natural attitudes of the animal, involves a low expenditure of chemical energy (compare Sherrington,[12] page 227) and obvious fatigue is not developed for long periods of time (*loco citato*, page 225).

The position assumed may be varied by the cerebro-spinal nerves. For instance, Magnus and de Kleijn[19] have shown that reflex postural contraction is relatively easily inhibited and a new position of the limbs assumed by passive movement of the head in the decerebrate animal. As Sherrington says: "There goes with each main posture of the head even passively imposed upon the decerebrate preparation, a corresponding reflex modification of the reflex posture of the limb" (*loco citato*, page 198). These modifications are traceable to the influence of the otic labyrinth and deep afferent nerves of the neck, *id est* the cerebro-spinal nerves lead to the taking up of the posture characteristic of the position of the head. It is the sympathetic innervation which maintains the attitude once assumed. The characteristic attitude fails to be maintained in the absence of these fibres, although it may be temporarily assumed as has already been shown.[17] [18]

I may now correlate the two lines of research that have already been outlined by summarizing the above results, *videlicet* the cerebro-spinal connexion of voluntary muscle imposes a posture upon the muscle reflexly or by voluntary activity and the sympathetic innervation subserves the function of maintenance of posture.

Sherrington's study of the deafferented specimen proves that plastic tonus is subserved by a proprioceptive reflex arc. I maintain that, in part, the process of deafferentation consists of severing the afferent limb of a sympathetic arc and that the efferent limb of this arc is made up of the post-ganglionic non-medullated nerve fibres supplying voluntary muscle, for plastic tonus also disappears when ramisection is performed. It follows that this sympathetic proprioceptive arc gives the shortening reaction at the end of the contraction phase of a deep reflex reaction[12] (page 211) and it leads to the fusion of reflex effects from slowly repeated serial stimuli which are absent in the deafferented preparation.

The deafferented specimen differs from the muscle following sympathetic ramisection in that the knee jerk is absent in the former condition[8] (page 126), while it is present, though less exaggerated and without the shortening reaction in the latter. In other words, the jerk element remains after sympathectomy, but disappears when the posterior nerve roots are severed. A somatic proprio-ceptive arc therefore subserves this element in the knee jerk.

In decerebrate rigidity both these reflex arcs are released from control. The somatic arc acts differentially, selecting the muscles which are anti-gravity in their effect in the normal posture of the animal. The sympathetic arc maintains this position of rigid extension in limbs of the dog and cat and in the lower extremities of man. Langelaan[20] suggested that the sympathetic innervation of voluntary muscle played a part in decerebrate rigidity. Royle's experiments are the first, however, to show consistent loss of plastic tone in this condition, although de Boer[21] claimed diminution of tone in the limb muscles of the frog after severing the *rami communicantes*. Langelaan[22] who recently repeated these experiments and confirmed de Boer's results, uses the terms contractile tonus and plastic tonus for the two elements of tone referred to above.

FIGURE VII.
Fowl forty-five minutes after the cervical sympathetic cord had been severed in the lower cervical region on the left side. Note the ruffling of feathers and the droop of the wing on this side.

It will be remembered that Sherrington[7] first referred to the phenomenon of plastic tonus as a cataleptoid effect. In this paper he says: "In applying the term cataleptoid to these reflexes, I do so because the reflexes recall, in some respects, strikingly certain phases of hypnotic condition." He reiterated this view in his subsequent papers.[8][12] I here suggest as a further step in the correlation of observations upon muscle activity and of the innervation of muscle that such cataleptic conditions are due to an exaggerated effect of the sympathetic element of the double nerve supply of voluntary muscle.

As Sherrington mentioned in his earlier paper[8] and dwelt upon in his special thesis later[12] the phenomenon of plastic tonus in skeletal muscle is comparable to the postural reactions of visceral and circulatory muscle. It has been pointed out in this and a previous paper[17] that postural activity of the visceral and circulatory muscle are subserved in the intact animal by the sympathetic (thoracolumbar) nerve supply. It has now been shown that the sympathetic innervation is responsible for the plastic tone of voluntary muscles. That is, the sympathetic system has a postural function on all these groups of muscle; the nerve connexions of voluntary and involuntary muscle in so far as this function is concerned are not different as Sherrington believed,[12] but the same. Speaking of the identity of plastic tonus and the postural reactions of the bladder, Sherrington says: "Both are instances of the postural contraction of muscle; though the relation of the central nervous system to the postural activity is very different in the two cases" (page 218). Such a difficulty is now cleared away and the identity of the muscle phenomenon in the two cases is probably due to the identity of nerve supply.

The double innervation of voluntary muscle is completed by the addition of cerebro-spinal nerves to subserve phasic reactions. Elsewhere[17] I have shown that the parasympathetic nerves constitute the second innervation of hollow viscera and vasodilator fibres cause intermittent dilatation of blood vessels. In other words, the phenomenon of

double innervation is a general one and the case of the double innervation of voluntary muscle is only a special instance of this condition. The sympathetic nerve supply in each case is responsible for the postural activity of the muscle whether it be voluntary, visceral or circulatory.

The Posture of the Wing.

In conclusion, I may illustrate the meaning of the double innervation of voluntary muscle by reference to the posture of the wing which I shall make the subject of a future communication. The normal posture of different animals may be very different. For instance, while extension of the limbs is the normal position for standing in the cat and dog, the habitual position of the frog is squatting. Brondegeest[23] showed that severing the posterior nerve roots on one side of the frog caused the lower limb to be less flexed on this side, thus showing the presence of a reflex tonus in the limb. The antagonistic muscles failed to give this result which greatly perplexed early observers. But Sherrington has pointed out[12] that "since it is the flexor muscles which execute this posture, and since reciprocal innervation of antagonists obtains in reflex posture, search for postural contraction is foredoomed to failure if made in the extensor muscles of the frog's hind limb."

Langelaan[22] following de Boer, has shown the effect of removal of the *rami communicantes* upon the attitude of the trunk and hind limb of the frog. When this is done on the right side, he says: "The trunk deviates to the left, the right hind limb is abducted from the body, the knee points laterally and the foot is not covered by the leg" (see Figure VI.). He showed that after a time labyrinthine reflexes become active and lead to a flexion of the right limb due to dominance of the left labyrinth. When the labyrinthine reflexes are exhausted or the animal has been quiet for a quarter of an hour, the undoing of flexion of the limb devoid of its sympathetic innervation may be seen. Plasticity of the muscle is diminished on the operated side, so that the degree of deformation of the muscle is diminished after contraction or stretching. The limb "returns therefore more nearly to its inherent equilibrium length" (page 446).

In the same way the wing of the bird is normally in the flexed attitude, *id est* postural contraction is exhibited by the flexor group of muscles as the bird stands and walks. Sherrington[12] says that section of the afferent roots of the wing affects little, if at all, the folded posture maintained by the wing when not in flight. I have been able to influence the posture of the wing by removing the cervical sympathetic chain in the fowl. Forty-five minutes after the operation the wing was markedly drooped on this side (left) as shown in Figure VII. At this time the animal had not completely recovered from the anæsthetic. Figure VIII. illustrates the altered position four hours later. Similar differences have persisted till the present time, *id est* for five days from the time of operation. The affected limb is abducted; the segments are less flexed on one another and in consequence the wing appears elongated; it droops to a distance of 1.5 centimetres below the intact limb. On stretching both wings to their full extent and releasing them simultaneously, the left was perceptibly slower in attaining its final position. Prior to performing a *post mortem* examination, I am uncertain whether the section is sufficiently far caudally to remove the influence of all the sympathetic rami upon the wing; but the palpebral fissure is reduced in the characteristic manner on the affected side and when ruffled, the feathers take longer to return to their original position than on the intact side. These observations prove that the sympathetic cord had been severed (compare Langley[24]). The voluntary movement of the wing on this side indicates that the somatic fibres remain uninjured. The wing appears to be slower and less rapid in action on this side.

FIGURE VIII.
The same bird as in Figure VII. seen from above four hours after the operation. Note the abduction and droop of the left wing. Owing to the flexion of this wing being less complete than normal it is somewhat elongated.

As a control I produced flaccid paralysis on the left wing of another fowl by dividing the trunks

of the brachial plexus (see Figure IX.). The difference between the attitude of the two wings shows that the somatic connexions remaining in the first bird tend to impose the flexed posture upon the wing. Due to the lack of plastic tonus the limb fails to be maintained in the same degree of flexion as on the intact side, the length of the muscle fibres not being fixed in full flexion by the sympathetic nerves. When voluntary movement restores the limb to the normal flexed position, it soon reverts to the drooped condition. After fatigue the difference between the position of the wing on the two sides becomes more marked.

This illustration shows that in the production of posture somatic reflexes impose the position upon the limb. The sympathetic reflex maintains this position. We therefore may agree with Langelaan[22] when he says that "muscle tonus depends upon two different properties of muscle and that these two properties are governed by two different sets of efferent nerves."

Acknowledgment.

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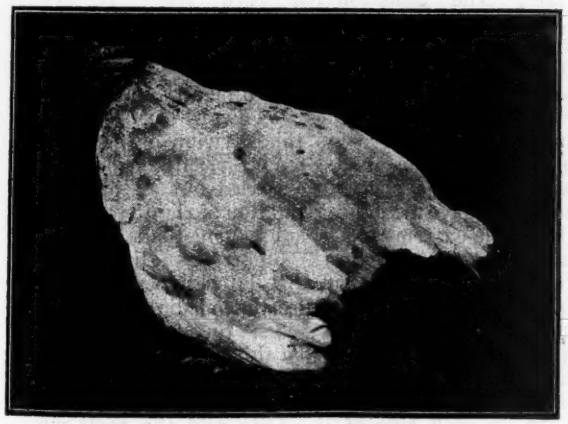

FIGURE IX.
Flaccid paralysis of the left wing in a control specimen.

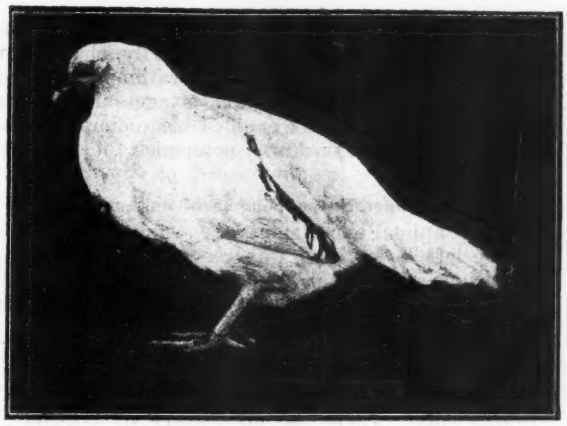

FIGURE X.
For comparison with Figure IX. This is the same specimen as in Figure VII. and Figure VIII. Note the partial closing of the palpebral fissure.

THE OPERATIONS OF SYMPATHETIC RAMISECTION.

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IN a previous communication[1] the treatment of spastic paralysis by the operations of sympathetic ramisection has been described. At that time

only two operations had been performed and the technique had not been satisfactorily elaborated. Since then a large number of operations have been performed on patients of various ages and the information gathered has enabled me to improve the technique and lay down principles of surgical procedure.

The Operation of Lumbar Ramisection.

In the animal experiments the sympathetic supply to the left lower limb was removed by destroying the whole abdominal sympathetic trunk. In the human subject this procedure could not be contemplated and after consulting Professor Hunter[2] regarding the exact distribution of the sympathetic nerves to the abdominal viscera I decided that the correct procedure was to remove the *rami communicantes* only. There is no danger of interfering unintentionally with the functions of the intestines or the bladder as long as the medially directed fibres from the second, third and fourth lumbar ganglia are left intact. Division of the abdominal sympathetic trunk below the fourth ganglion only affects the sympathetic fibres travelling with the fifth lumbar and the sacral nerves. The first operation was planned to define and to divide both the white and grey rami to the second lumbar nerve in addition to removing the grey rami to the third and fourth lumbar nerves and dividing the abdominal sympathetic trunk below the fourth ganglion.

The patient should be made to lie on the side opposite to that of operation and should be inclined slightly towards the surgeon who faces the patient's back. The space between the ribs and the crest of the ilium should be made as wide as possible by placing a sand bag beneath the patient or better still by using the adjustable support devised for operations on the kidney.

The incision is made to extend from the last rib to the crest of the ilium and thence forward to the anterior superior spine of the ilium. If the *quadratus lumborum* muscle can be palpated, the downwardly directed part of the incision should follow its lateral margin, but if not, the lateral margin of the *sacro-spinalis* may serve as a guide. The forwardly directed part of the incision should lie about one centimetre below the actual crest of the ilium. This enables the attachment of the external oblique muscle to be exposed. The flap of skin and fascia outlined by this incision is reflected forwards to expose the attachments of the *latissimus dorsi* to the lumbo-dorsal fascia and of the external oblique muscle to the crest of the ilium.

The *trigonum lumbale Petiti* is next defined and from this point forwards the oblique muscles are freed from the crest of the ilium to within six or eight centimetres of the anterior superior spine of the ilium. In doing this it is possible in most subjects to divide the external oblique through definite tendinous tissue close to its insertion and to avoid cutting the actual muscle fibres. This gives a decided advantage in closing the wound. The internal oblique and the *transversus abdominis* are divided through the muscle fibres close to their attachment.

The dissection is then carried upwards and the lumbo-dorsal fascia is divided at the lateral border of the *quadratus lumborum*. In doing this it may be necessary to cut through the fibres of the *latissimus dorsi*. The abdominal wall is now free to be thrown forwards and the hand can be passed in front of the *quadratus lumborum* and the psoas muscles until the medial border of the psoas is palpated. Suitable retractors are then placed in position. Care should be taken not to disturb the fascia covering the *quadratus lumborum* and the fascia covering the psoas muscle. The ganglionated sympathetic trunk will be found lying on the bodies of the lumbar vertebræ near to the medial border of the psoas muscle.

The abdominal sympathetic trunk on the left side is easy to define if the medial border of the psoas is sought. In this situation a thin layer of connective tissue passes from the psoas muscle across the sympathetic trunk and great vessels to the region of the psoas of the opposite side. This is easily slit with a blunt dissector and the sympathetic trunk comes into view. On the right side the trunk lies under the lateral margin of the inferior *vena cava* and is usually placed anteriorly to the lumbar vessels. This, however, is by no means constant for in several instances I have experienced difficulty from the lumbar veins crossing anteriorly to the sympathetic trunk. When this occurs, the trunk cannot be lifted without removing one or more of these veins. On the left side this complication has not been met, but in young subjects the lumbar arteries can be mistaken for *rami communicantes* which they sometimes resemble in size and direction. In a few instances the lumbar lymphatic vessels and an unusually low formation of the *receptaculum chyli* has made the definition of the sympathetic trunk more difficult. In one instance the lymphatic vessels lay between the sympathetic trunk and the attachments of the psoas muscle. On lifting the lymphatic vessels the rami appeared from their posterior surfaces and it required patient dissection to define each structure. The ganglionated cord itself is very variable in its structure and this particularly applies to the region of the fourth lumbar vertebra. On several occasions the cord in this situation has been found to divide and the difficulty is to decide which division continues downward as the main trunk. On one occasion this division of the trunk produced for me an incomplete result on one limb when the same procedure carried out on the opposite limb gave a definite reduction of rigidity through the whole extremity. The subsequent plan I adopted was to define the fourth lumbar ganglion, lift it from its bed and remove its lateral, posterior and inferior connexions while the medially directed rami were preserved. When the fourth lumbar ganglion is not present, the third may be unusually large and supply rami to the third and fourth lumbar nerves. The size of the ganglionated cord may vary on each side of the body and the rami may or may not come from the region of the ganglia. The size of the ramus varies with the number. A single ramus supplying a single nerve may be easily

two millimetres in diameter though the usual size for a ramus is between 0.5 millimetre and 1.5 millimetres. In defining the lower limit of the operation the trunk may be divided below a definite fourth lumbar ganglion or if this be not present as low down as it is possible to trace it. The iliac vessels are to be avoided in this part of the operation.

The upper limit of the operation is the region of the second lumbar ganglion and this is found in relationship to the second lumbar vertebra shortly after the sympathetic trunk appears from under the medial lumbo-costal arch. The usual arrangement of connexions of the second lumbar ganglion is a little different to that of other ganglia. This ganglion almost invariably receives a large white ramus from the first lumbar nerve and the ramus approaches the ganglion obliquely from above downwards and medially. It may or may not be accompanied by a small grey ramus. In the first operation this ramus was mistaken for the white ramus of the second lumbar nerve and was divided, but not at subsequent operation unless a special therapeutic effect was sought. In every operation both the white and grey rami to the second lumbar nerve have been divided. The position of the ganglia may cause considerable variation in the position and the direction of the rami, but with the exception mentioned above the rami tend to travel laterally or laterally and downwards.

The removal of the white ramus of the first lumbar ganglion has to be considered when dealing with spastic paraplegia. In hemiplegia no detrimental effect follows, but in paraplegia requiring ramisection on both sides the character of the control of the bladder and rectum has to be considered. The removal of this white ramus is not an essential part of the operation and should not be carried out without a definite reason. This ramus has been absent in one instance only.

The method of dividing *rami communicantes* is usually by avulsion. Each ramus may be seized by a pair of forceps and drawn away from its lateral connexions. In many instances, in young subjects particularly, a blunt dissector may be used to free the ganglionated cord quickly and effectively from its grey rami.

After ramisection of the second, third and fourth ganglia has been effected, the cord is divided below the fourth ganglion and the operation completed. The edges of the lumbo-dorsal fascia are first sutured in the region of the *trigonum lumbale*. The oblique muscles are then sutured to the crest of the ilium making a point of suturing the tendinous portion of the external oblique on to its original attachment and to the adjacent *fascia lata*. The lumbo-dorsal fascia and the *latissimus dorsi* muscle are then sutured. The skin can be closed without drainage.

The whole operation should be performed with very little loss of blood except from small vessels occasionally encountered in freeing the oblique muscles. There is no bleeding in the depth of the wound if the approach is confined to the plane between the peritoneum and the fascia covering the *quadratus lumborum* and the psoas muscles. Sharp instruments should not be introduced into this wound. All that is necessary can be done with blunt dissectors and long artery forceps. The ilio-hypogastric and ilio-inguinal nerves are both retracted forwards with the abdominal wall and the ureter with the parietal peritoneum. Owing to the depth of the wound it is inadvisable to attempt the operation in the adult male subject without suitable instruments. A broad and deep retractor and long blunt dissectors are absolutely necessary. My own retractor for the adult subject is 8.75 centimetres wide and 12.5 centimetres deep and is curved in its width so as to present a concavity opposite the point of dissection in the sympathetic cord. My dissectors are 25 centimetres long and I also use a long probe with a flat handle and curved on the end like a strabismus hook for lifting the sympathetic trunk when defining its branches. The only other essential instrument is the long straight, or slightly curved artery forceps. These should be twenty centimetres long and four should be provided.

In the well developed adult male also the psoas muscle creates a difficulty by obscuring the sympathetic trunk with its anterior convexity. A modified Thomson-Walker retractor is useful to flatten this muscle. In children or young adult females this difficulty is not present and the large blunt dissectors may be used for the purpose.

The incision has been designed as far as possible to divide only the fibrous structures in approaching the sympathetic trunk. The internal oblique and the *transversus abdominis* muscles have, however, to be divided through their muscle fibres. The incision also avoids all important nerves and blood vessels and, if carefully sutured, should leave the abdominal wall as strong as before the operation.

The Operation of Cervical Ramisection.

The *rami communicantes* to the brachial plexus enter the nerve roots after they emerge from the inter-vertebral foramina. According to the description of normal anatomy the nerve roots should emerge between the *scalenus anterior* and the *scalenus medius* muscles. At operation it is exceptional to find this arrangement. It is much more common to find the fifth and sixth roots piercing the *scalenus anterior* and in several instances these roots have appeared anteriorly to the muscle. The seventh nerve also is commonly separated from the eighth by a bundle of muscle fibres.

The eighth and the first thoracic nerves usually emerged together in a plane posterior to the *scalenus anterior*. A regular plexus considerably simplifies the operation, while the difficulty is increased if each nerve root emerges separately through the *scalenus anterior*.

The patient is placed in a reclining position with the chin turned away from the site of operation and with a small pillow placed beneath the shoulders.

The field of operation is reached through an incision extending from the clavicular insertion of the sterno-mastoid backwards and upwards across the posterior triangle. In young subjects and in those patients in whom the nerve roots all emerge from behind the *scalenus anterior*, this incision suffices, but occasionally it is necessary to make a second small incision upwards along the posterior

border of the sterno-mastoid to be sure of reaching the connexions to the fifth and the sixth nerves. The platysma is divided and the external jugular vein is secured in the line of the original incision. The anterior layer of the cervical fascia is divided and blunt dissection is then carried out to expose the deeper layer of fascia covering the brachial plexus and the scalene muscles. Between these two layers of fascia the *transversus colli* artery will be found occasionally. This, however, is not the constant arrangement, for usually the artery appears between the nerve roots and in my series most frequently between the seventh and the eighth nerve roots. To obtain a clearer view of the plexus this artery should be ligated and divided. The omohyoid muscle which also appears in this space, can be easily retracted downwards out of the field. The nerve roots should then be traced to their emergence from the intervertebral foramina. The subclavian artery should be identified and retracted forwards to expose the eighth cervical and the first thoracic nerves. The *rami communicantes* are not easy to define. Those to the fifth and sixth nerves may come across the anterior surface of the *scalenus anterior* before joining the nerve trunks or they may come through the muscle itself. In addition there may be more than one branch and it is necessary in dealing with each of the nerve roots to be sure that all anterior connexions are divided right up to the intervertebral foramina. The grey ramus may join the nerve root at its antero-inferior aspect and in many instances it must be sought there. This particularly applies to the eighth nerve. Medullated muscular branches will also be found on the anterior aspect of the nerve roots. These may be confused with sympathetic rami and if there is any doubt, should be removed. In the upper part of the plexus it is necessary to look for and define the phrenic nerve as it lies on the anterior aspect of the *scalenus anterior* muscle. When the phrenic nerve receives communications from the fifth cervical nerve, it will be found necessary to retract it laterally to get a clearer view of the trunk of the fifth nerve. The greatest difficulty will be found in connexion with the eighth cervical nerve and the first thoracic nerve. In approaching this part of the dissection the first rib should be palpated and the first thoracic nerve sought as it crosses the neck of the rib. This nerve trunk can then be traced into the thorax. The cervical sympathetic trunk will be found on a plane posterior to the subclavian artery and if this can be well defined, no difficulty will be experienced in picking up the communicating ramus to the eighth nerve. At this point the trunk usually moves to a more medial position as it travels into the neck, but sometimes it will be found lying upon the root of the eighth nerve. Rami will also be found communicating with the first thoracic nerve, but the connexions with the first thoracic ganglion are only defined by exercising great care. There is a white ramus in this position which should be avoided. After ramisection has been completed the wound is closed by drawing together the edges of the platysma and by suturing the skin without drainage.

ON THE CHOICE OF PROCEDURE ADOPTED IN THE OPERATION OF RAMISECTION FOR SPASTIC PARALYSIS.

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WHEN Dr. N. D. Royle first decided in August, 1923, to perform an operation for spastic paralysis by removing the influence of the sympathetic nerve supply to the voluntary muscles of the lower extremity, the first guiding principle that was agreed upon, was to confine as far as possible the effects of the operation to selective removal of this influence without involvement of the nerve supply to involuntary musculature in regions remote from the limb. He has called the operation devised on this principle ramisection because the *rami communicantes* alone are divided. I first thought that the distinction between the white and grey rami in the lumbar region would not be sufficiently clear under the conditions of a human operation in a deep field to enable him to avoid removal of white rami as well as grey. It was therefore decided to remove the *rami communicantes* of the second, third and fourth lumbar ganglia and to cut the ganglionated cord below the fourth lumbar sympathetic ganglion.

The first part of the procedure, *videlicet* ramisection of the second, third and fourth lumbar ganglia effectively removed the influence of the sympathetic system from the musculature receiving its nerve supply from the upper part of the lumbar plexus, notably the ilio-psoas, *quadriceps extensor* and the adductors of the thigh, together with the muscles supplied by the contribution of the fourth lumbar nerve to the lumbo-sacral trunk. At the same time it avoided any injury to the hypogastric nerves which pass medially to communicate with the hypogastric plexus and after relay in the inferior mesenteric ganglion continue to supply the bladder and rectum. However, severing the white rami of the upper lumbar nerves removed part of the influence of the hypogastric nerves, as was exemplified by the increased activity of the pelvic nerves of the parasympathetic system. This considerably relieved the constipation of the patient which like the spastic hemiplegia from which he suffered, was a sequela of a gun shot wound of the cortex in 1917. This effect, its therapeutic value and its experimental basis have been dealt with in previous communications.[1][2]

Dr. Royle demonstrated at his first operation that it was possible to avoid injury if desirable to the white *ramus communicans* of the first lumbar nerve. It was larger than the grey ramus (or rami) and cephalad in position and of a firm whitish appearance Dr. Royle, therefore, modified the operation by cutting the grey ramus only, when it was not desired to affect the functions of the bladder and rectum. The nerve fibres which constitute the white rami of the second and third lumbar nerves, may be removed on both sides without noticeable

effect. Harman's paper[3] exemplifies the variations in the number of grey rami in the lumbar region.

The procedure of severing the ganglionated sympathetic cord removes the influence of the sympathetic system conducted by the grey rami below this level to the roots of the lower part of the lumbo-sacral plexus. Together with removal of the grey ramus of the fourth lumbar nerve, therefore, it affects notably the muscles supplied by the sciatic nerve and its branches, the gluteal muscles and the small lateral rotators of the thigh.

At the same time it has no influence on the pelvic nerve of the parasympathetic system. The cells of this nerve are in the intermediate sacral segments of the cord. They are not connected with the ganglionated sympathetic cord, but with small ganglia in the pelvic plexus on the course of the nerves to the viscera innervated by them.[4]

Ramisection in the cervical region aimed at removing the influence of grey rami upon the roots of the branchial plexus. The approach decided upon was to expose these roots behind the *scalenus anterior,* enabling the phrenic nerve and the great vessels of the neck and vagus nerve, together with the sympathetic trunk itself, to be retracted medially. By tracing the nerves to the intervertebral foramina, a point of considerable importance, for some sympathetic communications are to be found at the point of exit of the nerves from their foramina, Dr. Royle has succeeded in obtaining a very complete effect on severing the connexions which present themselves. The absence of white rami, with the exception of the white ramus of the first thoracic nerve, renders the problem simpler than it would otherwise be. Unlike muscular branches of the brachial plexus, the grey rami become incorporated with the nerves of the plexus as they proceed distally. On avulsing them, therefore, the fibres may be traced distally into the nerve. Muscular branches are formed of funiculi, diverging proximo-distally from the roots of the plexus. They are therefore distinguishable from the rami even though they may turn medially and downwards after leaving the nerve. The white ramus of the first thoracic nerve may be left intact by this method of approach, so avoiding pupillary effects. It is more medial than the grey ramus and proceeds downwards and laterally. A detailed description of the connexions of the rami of the sympathetic system is in the course of completion by Dr. T. K. Potts, in the Department of Anatomy, University of Sydney.

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NOTE ON THE MODE OF TRANSMISSION OF PNEUMOCOCCAL INFECTION.

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IN a former communication[1] which presented the results of an investigation concerning the incidence of the several serological types of pneumococci in the pneumococcal infections of childhood, it was shown that by comparison with the findings in other countries infection due to pneumococci of Type II. occurred infrequently in this State.

Among one hundred and twenty children suffering from lobar pneumonia and admitted to the wards of the Children's Hospital, Melbourne, the various types of pneumococci, as determined upon pure cultures isolated from the sputum were distributed as follows: Type I., 38.3%; Type II., 5%; Type III., 5.8%; Type IV. (Penfold), 0.8%; heterogeneous group, 40.8%; streptococci, 9.2%.

The observations of other Melbourne workers also shows that incidence of infection by Type II. pneumococcus in this city was relatively low during the three years 1920-1923. Patterson,[2] whose results were gathered during the earlier part of this period, stated the occurrence of Type II. pneumococcus in lobar pneumonia of adults as 9% and Warner,[3] working in 1922 and 1923 found that Type II. comprised 9.7% of one hundred and forty-four cultures of pneumo-streptococci recovered from adult patients affected with lobar pneumonia.

In contrast with these figures for Victoria may be placed those recorded for England and the United States of America. In these countries Type II. pneumococcus has been identified with 32.7%[4] and 29%[5] respectively of all cases of lobar pneumonia.

It was particularly interesting, therefore, to meet with the Type II. pneumococcus as recovered from the pus obtained from the knee-joint of an infant affected with acute arthritis and the principal object of the present contribution is to show that contact infection with Type II. pneumococcus occurred between mother and baby and that the mother acted as a "carrier" of Type II. pneumococcus for a period of at least twenty-one days.

A.P., a female infant of three months of age, was admitted to the Children's Hospital, Melbourne, on September 14, 1923, for the surgical treatment of acute arthritis affecting the right knee-joint.

According to the mother's statement for four days previously the baby had cried whenever the right leg was moved or handled. Distension of the capsule of the knee-joint accompanied by swelling and undue heat in the peri-articular tissues was apparent to clinical examination.

On the following day, September 15, Mr. Hamilton Russell incised the knee-joint from the lateral aspect and evacuated a quantity of pus, the detailed bacteriological examination of which is important for the purpose of this paper.

A smear preparation showed the presence of large numbers of capsulated diplococci, which retained the stain when subjected to Gram's method of staining, and on

morphological grounds were classified provisionally as pneumococci.

Inoculation of tubes of veal broth, of reaction represented by pH = 7.7, resulted in a growth which in its macroscopical and microscopical characters indicated a pneumococcus. Complete clarification on the addition of one part of ox bile to five of the culture and specific agglutination by the diagnostic serum for Type II. pneumococcus to the full titre of the serum established the identity of the organism.

In view of the fact that this culture of pneumococcus, the seventy-fifth examined with reference to serological type in 1923, was the first example of Type II. for the season, I made careful inquiry of the mother and elicited the following facts bearing on the child's illness. The baby who was naturally fed, had previously been well and, with the exception of a "cold," the signs of which appeared a few days before the first indication of trouble in the knee-joint, had suffered no interruption to her progress. The mother herself had contracted a "cold," the onset of which, as nearly as she could recollect, was on September 1. One week later the baby developed a "cold" and had been affected by it for three days when the mother noticed for the first time that the child cried whenever she moved her right leg.

The next step was to obtain specimens of sputum from both mother and baby. On September 17 at 4.30 p.m. two white mice were inoculated intra-peritoneally, one with a saline emulsion of the sputum of the mother and the other with the baby's sputum prepared in the same manner. The course of events in both mice was practically identical. At 10 a.m. on the following day the mouse inoculated with the sputum of the mother was found dead and that infected from the baby was moribund. The peritoneal exudate in both mice was literally teeming with micro-organsims which on their microscopical characters were judged to be pneumococci, and there appeared to be no other bacteria present.

By the adoption of the usual technique for the recovery of pneumococci by the method of mouse passage the organisms were obtained suspended in saline solution, freed from pus cells and inflammatory exudate and in condition appropriate for the immediate performance of agglutination tests with the specific sera for the identification of pneumococcus "types." Such tests were carried out, and yielded results identical with those shown below as having been obtained with the broth cultures made from the heart blood of the inoculated mouse. Pure cultures of pneumococci, completly bile-soluble, were obtained in broth from the heart blood and from the peritoneal exudate of each mouse. Agglutination tests were performed on the heart blood culture in each instance, with results as set out in the following table. Those attending the examination of the pneumococcus obtained from the pus evacuated from the baby's knee joint are included in order to facilitate comparison of the pneumococci derived from the three sources.

Pneumococci of the same serological type were thus recovered from the sputum of the mother, the sputum of the baby and from the pus in the baby's knee-joint. As judged by its effect on the mice the Type II. pneumococcus present in the two specimens of sputum was possessed of a high degree of virulence.

On September 24, 1923, another sample of sputum was obtained from the mother and again pneumococcus Type II. was cultivated from both peritoneal exudate and heart blood of the inoculated mouse. A similar examination of the material, obtained by passing a swab over the pharyngeal wall after inducing cough in the case of the baby, was attended by a "negative" result in that pneumococci were not recovered. Three days later, however, September 27, pneumococcus Type II. was again isolated from the baby's sputum.

On September 29, it was found necessary to make an incision on the medial aspect of the child's knee-joint and the pus obtained thereby enabled the original finding of Type II. pneumococcus as the organism infecting the joint to be confirmed.

Examination of the mother's sputum on October 1 showed that pneumococcus Type II. was still present in her respiratory passages. On October 8 she was unable to expectorate sputum; the naso-pharyngeal secretion was therefore employed and again pneumococcus Type II. was recovered. This determination was made twenty-one days after the first examination of the mother's sputum and inoculation of a mouse with the material obtained by a pharyngeal swabbing from the baby on the same date failed in the detection of Type II. pneumococcus.

Having made a good recovery, the baby was discharged on October 12 and although the mother reported for further examination on October 15 and 22, attempts to recover the Type II. pneumococcus from her naso-pharyngeal secretions were unsuccessful on both occasions.

The observations on this mother and baby illustrate the utility of the identification of serological types of pneumococci as applied to the elucidation of the paths of transmission of pneumococcal infection.

In the United States of America investigations of wide scope regarding the distribution of the different types of pneumococci in lobar pneumonia have proved of great epidemiological value and provide strong evidence that this disease is in the majority of instances acquired by contact infection.

In the United States Types I. and II. are regarded as the strictly disease-producing types of pneumococci and are together responsible for 65% to 70% of all cases of lobar pneumonia. The important fact has been established that these types of pneumococci are very seldom found in the throats of healthy individuals who have not been in contact with lobar pneumonia.

In an examination of the saliva of two hundred and ninety-seven unexposed persons Stillman[6] recovered pneumococci from one hundred and sixteen and of these 0.8% and 0.0% respectively were of Types I. and II.. On the other hand, when one hundred and seven normal persons known to have been in contact with lobar pneumonia due to Type I. pneumococcus were examined, pneumococci of Type I. were recovered from 15%, and from a similar number of Type II. contacts pneumococci of Type II. were recovered in 6%.

SERUM.

Source of Pneumococcus.	Type I.			TYPE II.				Type III.		Normal Control.	
	1:10	1:20	1:40	1:2	1:5	1:10	1:15	1:2	1:5	1:5	1:10
Baby's knee-joint	—	—	—	+++	+++	++	+	—	—	—	—
Baby's sputum	—	—	—	+++	+++	++	+	—	—	—	—
Mother's sputum	—	—	—	+++	+++	++	+	—	—	—	—

Dochez and Avery[7] in a discussion of the question of pneumococcus carriers recorded that in an examination of healthy individuals in intimate contact with eight patients affected by Type I. lobar pneumonia Type I. pneumococcus was recovered from one or more associates in the case of three of the patients. When the contacts of twenty-four patients with Type II. lobar pneumonia were examined, one or more of those of ten of the patients was shown to harbour the Type II. pneumococcus. The approximate average duration of the carrier state in healthy contacts was twenty-three days and in convalescents twenty-eight days.

The writers quoted consider that healthy carriers and convalescents constitute the two man sources of danger in the transmission of lobar pneumonia.

In the case of the mother and baby here reported the sequence of events as ascertained by the clinical history was that the mother contracted a "cold" and a week later the baby was similarly affected; within a few days the first indications of arthritis appeared in the infant.

It is submitted that the mother acquired an infection of her respiratory tract by pneumococcus Type II. and passed it on to the baby in whom it first appeared as a catarrhal inflammation of the upper air passages and subsequently as a purulent arthritis.

Incidentally, it might be mentioned that many instances of so-called "primary" pneumococcal arthritis are probably so described inaccurately. In this particular case the finding of identically the same organism in the respiratory tract of mother and infant and in the affected joint, taken into consideration with the sequence of events, precluded the use of that unsatisfactory term.

The mother was shown to carry pneumococcus Type II. for twenty-one days and the probability is strong that this organism could have been recovered from her sputum at any time during the fourteen days prior to that on which she first came under observation. She stated that there had been no illness in the house where she lived and as she was employed in domestic service at the time the baby became ill, it was scarcely feasible to examine the other inmates of the house with a view to the detection of other carriers of Type II. pneumococcus.

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(7) A. R. Dochez and O. T. Avery: "The Occurrence of Carriers of Disease-producing Types of Pneumococcus," *The Journal of Experimental Medicine*, 1915, Volume XXII., page 105.

Reports of Cases.

"A BAD APPENDIX."

By E. MORRIS HUMPHERY, M.B., Ch.M. (Sydney).
Honorary Surgeon, Royal North Shore Hospital, Sydney.

G.K., aged fifty-two years, was admitted to the Royal North Shore Hospital on December 20, 1923, having suffered from pain in abdomen and vomiting for ten days. He had no history of previous illness and was a very temperate man. For the previous four months he had been feeling off colour with distension and belching of wind after meals and had lost 6.3 kilograms (fourteen pounds) in weight. No pain had occurred until the advent of the attack, for which he was admitted. He was usually very constipated with an occasional attack of diarrhœa, but never passed any blood or mucus. He said that his work worried him a good deal. Ten days before admission gradually increasing pain began in his abdomen. He vomited once on the first day and four or five times on succeeding days, but had not vomited during the four days before admission. Constant headache had been present for ten days, no epistaxis had occurred. His bowels had acted right through three or four times a day.

On examination he looked very ill, sallow and emaciated, the tongue was brown and thickly furred, breath was very foul, teeth were filthy. The abdomen was fixed on respiration with a noticeable swelling in right lower quadrant, the recti muscles were tightly on guard and he was tender all over.

Under ether as soon as the skin was cut there was a welling up of foul-smelling pus with a sickening odour that made nearly everyone in the theatre feel ill. The pus came from a huge cavity that extended from the pelvis to the back of the right kidney and had also forced its way through adhesions into the general abdominal cavity and a general peritonitis was just commencing. The cavity was well opened up and quickly swabbed out with dry rough gauze to gather all the debris of the tissue that had been destroyed; this included a good deal of the wall of the ascending colon and the appendix which was represented by some shreds of greyish black sloughing material. There was a good deal of oozing from the surfaces left and the cavity was packed with dry gauze and two large rubber drain tubes were inserted from the flank. About a litre of pus was evacuated. The abdominal wound was sewn up with a large drain inserted as far as the deepest layer of muscles, but not into the peritoneum. His condition on leaving the table was desperate and it was not thought that he would live through the night. However, in twenty-four hours his outlook was a little more hopeful, his pulse was better in volume and had dropped from one hundred and eighty to one hundred and twenty and his temperature was only 37.8° C. (100° F.), he had not vomited and there was a profuse fæcal discharge through his tubes. He continued to improve, the fæcal discharge stopped gradually and became purulent, his appetite became good and he obviously put on weight. After six weeks the discharge was still moderately profuse so he was anæsthetized so that the cavity could be explored in an attempt to secure better drainage. The upper part was found to have closed in, but there was a large pocket down towards the right groin, a counter opening was

made at the lowest part of this cavity and it was swabbed out hard with rough dry gauze and packed with gauze soaked in a mixture of menthol in glycerine. A large tube was put into both openings and the patient allowed to sit up in bed to encourage pressure on the cavity and more free drainage. He was discharged on February 29, 1924, with the original flank wound weeping a few drops of thin serous pus.

I can only attribute his recovery to a wonderful resistance to such a large area of necrotic tissue and the fact of having scrubbed out as much as possible of the infective material at the first operation and so cutting off the supply of poison. In all cases of suppuration with necrosis, even with a patient *in extremis* from absorption, it at least gives a chance of recovery if as much of the dead tissue as can be removed is either curetted or wiped away without damage being inflicted on the underlying tissues and if the surface is left as clean as possible.

Reviews.

ULCERATION OF THE STOMACH AND DUODENUM.

"Two Lectures on Gastric and Duodenal Ulcer" is the title of a small book which has been published by Sir Berkeley Moynihan. In this he records in his inimitable style his experiences in the problems which occurred in his surgical treatment of duodenal and gastric ulcer over the last ten years.

Only surgeons who are specially interested in this branch of work, will appreciate to the full the value of the author's observations on the difficulties in the diagnosis of these diseases and his remarks on this section of the subject display the wisdom which we have learned to expect from such a master. There is no doubt that very few surgeons can extract the lessons and precepts Moynihan does from clinical research in "The Pathology of the Living."

A feature of the book is his criticism of medical treatment. Moynihan points out that medical treatment entails great loss of time; that recurrence takes place in most cases sooner or later. He says: "There must be cases in which a recurrence never takes place, but although I have made a long search which cannot be called desultory, among my patients, I have not met with half a dozen of whom this can truthfully be said." He also points out that medical treatment has obtained a false reputation because the subsidence of symptoms was often taken as a cure when, as we now know, the ulcer may have been still unhealed. Cures, he thinks, are reported in patients who probably have not suffered from ulcer, because the diagnosis of gastric ulcer is notoriously difficult. Medical treatment, moreover, takes no account of carcinomatous degeneration or the inter-relationship of abdominal disease and above all the mortality from medical treatment is a cause for consternation when carefully considered. In the Leeds Infirmary during the last ten years, statistics were taken out by Professor Stewart for him and these showed that two hundred and four patients with gastric and duodenal ulcer died from perforation or hæmorrhage during the period. In only about a dozen were the ulcers acute; the remainder were chronic ulcers and the records showed that a majority of the patients had been under treatment. His own mortality in the surgical treatment of chronic gastric ulcer over the same periods comprised a very few patients and was insignificant when compared with the staggering mortality from medical treatment and, as the author very aptly remarks: "A patient is just as dead if he dies after medical treatment as he is when he dies after surgical treatment."

Moynihan very rightly deplores the fact that the physician does not avail himself of the opportunities of learning in the operation theatre.

Gastrectomy with a mortality of 1.6% over the last decade was the most successful treatment for chronic gastric ulcer in his hands, but we would like to point out that the average surgeon must not expect such results and that perhaps he should more frequently practise less radical methods.

In the treatment of duodenal ulcer Moynihan says gastro-enterostomy will really cure 90% of patients. Most unsuccessful gastro-enterostomies, he says, are due to defective technique on the part of the surgeon, rather than to the operation. We agree with him that there is no operation which looking so simple to perform, is yet so susceptible to errors in technique and performance and in which a very insignificant slip is fraught with such disastrous results.

The author describes in detail the causes and treatment of jejunal ulcer and he employs many ingenious methods for dealing with this very difficulty problem. The reader will also be interested in the many points of view presented by this surgeon in the chapter on recurring hæmorrhage after gastro-enterostomy.

The book which will be most appreciated, is pleasant to read and has one beautiful illustration of the method of gastrectomy practised by the author.

[1] "Two Lectures on Gastric and Dudoneal Ulcer: A Record of Ten Years' Experience," by Sir Berkeley Moynihan; 1923. Bristol; John Wright and Sons, Limited; Royal 8vo., limp cover, pp. 48. Price: 2s. 6d .net.

GERIATRICS.

ON reading the title of Dr. Thewlis's book, "Geriatrics," many young practitioners and perhaps some older ones might seek a dictionary.

On the title page the book is described as a treatise on the prevention and treatment of diseases of old age and the care of the aged. The book is useful as there is not an extensive literature dealing exclusively with this subject and it contains many interesting features and some valuable information.

In the early chapters the author describes the normal anatomical and functional changes as well as the pathological changes commonly found in old age and he emphasizes the importance of recognizing normal degenerative changes and not regarding them as due to disease.

In a chapter on general measures for the care of the aged most of the hygienic measures suggested are those usually accepted. A striking feature, however, is the freedom with which alcohol is prescribed. Also in the treatment of various infections and other conditions the author recommends the prescription of alcohol in unusually large doses and considers that it should be pushed till a physiological effect is produced.

He blames intestinal toxæmia for many conditions of ill-health in the aged and considers that if attention is paid to the intestine one of the greatest problems of geriatrics will be solved.

Another condition commonly present and frequently overlooked is chronic nephritis and this he thinks is responsible for a variety of symptoms found in old people. Syphilis, he thinks, is frequently a factor in the ætiology of this condition. He thinks that senile prostatic hypertrophy is due to chronic nephritis and he finds that many cases respond to medical and electrical treatment, but some must be treated surgically.

We are struck by the author's optimism regarding the results of treatment in many conditions, but the numerous drugs recommended in certain instances suggest that in these at least a certain amount of pessimism is justified.

A chapter on the curability of hepatic cirrhosis and ascites will interest many people. That on diagnostic errors deals mainly with errors against which every student is warned early in his course.

Though medical practitioners are familiar with the subjects dealt with in this book, those who read it, will find it interesting and in many respects useful.

[1] "Geriatrics: A Treatise on the Prevention and Treatment of Diseases of Old Age and the Care of the Aged," by Malford W. Thewlis, M.D., with Introduction by A. Jacobi, M.D., LL.D. and I. L. Nascher, M.D.: Second Edition, Revised and Enlarged; 1924. St. Louis: C. V. Mosby Company; Demy 8vo., pp. 401. Price: $4.50.

The Medical Journal of Australia

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Diction for Medical Practitioners.

FROM the earliest times the art and practice of medicine have been more or less intimately bound up with education and the ideals associated with it. The attainments of the early medical practitioner were of a comprehensive nature. He was versed in the philosophical teaching of the day and the dogmas and practices of religion were not a closed book to him. He was frequently a man of letters. In any case he held an honourable and exalted position in the community. He was respected for his learning as well as for his knowledge of the healing art. In the system of medical education known to the present generation there is a certain recognition, inadequate perhaps, but nevertheless present, of the necessity of knowledge of the *litteræ humaniores*. The prospective medical student is required to produce evidence that he has attained a certain standard of general education. In the opinion of many the standard set in this regard is wholly inadequate and they would compel the student, as is done in some other countries, to take a degree in arts before entering upon his medical curriculum. It is not intended to discuss this aspect of the question at present. It is sufficient to recognize the logical reasoning behind it. Medicine is rightly numbered among the learned professions. In its evolution knowledge has been gathered from every age and from every clime. Men of practically every race have contributed something to its present structure. In these circumstances the lowest possible *desideratum* for the intelligent student of medicine is that he shall have a thorough knowledge of his own native tongue.

The dissemination of knowledge in medicine depends on the individual efforts of its votaries. These may be laboratory workers whose whole time is occupied by an endeavour to throw light on hidden mysteries or half-revealed truths or, being engaged in the practice of preventive or curative medicine, they may record their observations and by correlating them with the findings of others add something to the common fund of knowledge. In either case the keen worker becomes so engrossed in his pursuits that in many instances they colour all his activities. He uses abbreviations in describing his routine work and carries these with him into his every day conversation. Ultimately there is developed a jargon and a form of slang which conveys little or nothing to those conversant only with King's English or leaves a wrong impression with them. Conversation of this type becomes the language used in formal discussions at medical society meetings and in scientific papers read at such gatherings. Many examples could be quoted, but one or two will suffice. It is quite common to hear the statement that a certain specimen of urine is "one-quarter albumin." This statement is correct neither from the point of view of volume or weight. What is meant is that the amount of precipitated albumin has settled in the test tube so that it occupies one quarter of the column of urine. The level of the albumin will vary indirectly up to a certain point with the length of time during which the test tube has been allowed to stand. Centrifugation also will yield quite a different level. Another common example of error is that a sample of urine is "loaded with sugar." This means nothing at all. If an observer wishes to indicate anything more than the presence of sugar, a quantitative estimation is the only legitimate means of doing so. There is another imperfection in the language commonly used by medical practitioners. In describing the condition of a patient the objective signs are not infrequently referred to in such a way that a wrong impression is created and unjustifiable conclusions may be drawn. This does not refer to the diagnosis of a condition, but to such statements as "the patient was very toxic.." The practitioner may desire to point out that pyrexia is present, the pulse rate is increased and the colour of the patient is bad. In his statement, however, he assumes possibly without justification the presence of a foreign toxic substance in the blood.

In all medical discussion simplicity of language is essential. It has been stated that a sentence con-

taining more than nine words is not an English sentence. This was probably an intentional exaggeration, but it is a fact that simplicity and brevity are the secret of successful discussion. Lack of care and indulgence in complicated sentences will often lead to ambiguity. A carefully worded sentence has only one meaning. The speaker or writer who indulges in ambiguous phrases or those with cumbersome and indefinite verbiage, leaves himself open to the suspicion if not the accusation that he does not understand his own statement. It is the happy lot of few to follow in the literary footsteps of men like William Osler or Sir Clifford Allbutt. The attempt to do so, however, will be stimulating to the individual and more satisfactory to brother practitioners in his immediate environment.

Current Comment.

VARIATIONS IN GASTRIC SECRETION.

THE introduction of gastric analysis by the withdrawal of one sample of stomach contents and submitting it to an elaborate examination led to a better understanding of the functional activities of that organ both in health and disease. It was hoped that the adoption of the "fractional" method would be the means of throwing much new light on the question of gastric secretion. To a certain extent this hope has been realized. As examples of the type of knowledge gained in this way the recent communications to this journal by Apperly, of Melbourne, may be quoted. At the same time there are some observers who hold that no great diagnostic importance can be attached to the results obtained from the examination of test meals. They further maintain that the introduction of the fractional method has not done much to improve the position. There are those who think that it has only made confusion worse confounded. One of the reasons for this view is probably the fact that variations in the composition of gastric secretion of normal individuals may be of considerable magnitude. Moreover it has been pointed out that in the absence of a standard test meal the results of different workers are not strictly comparable. Another reason for the non-acceptance of the results of the test meal is that there is no type of acidity in disease which has not been encountered in apparently normal individuals.

The question of variations in the composition of the gastric juice in normal individuals has been investigated by several workers. Among these was Kopeloff who showed in 1922 that several curves taken in one week from the same individual under similar conditions might differ very considerably from one another. Kopeloff later on extended his work and found wide variations in the acidity of fractions consisting of ten cubic centimetres drawn at frequent intervals three-quarters of a hour after a test meal. He also inserted three Rehfuss tubes into the stomach of one individual and aspirated fractions simultaneously from the three tubes at fifteen minute intervals. In this way he found considerable variation in the acidity of different parts of the stomach at the same moment.

The question of variation in gastric secretion has also been investigated by Dr. J. R. Bell and Dr. William MacAdam.[1] They refer to Kopeloff's work in 1922 and state that Kopeloff did not say how his tests were carried out. They make reference to the findings of variations in acid values in different normal persons by Lyon, Bartle and Ellison and to the fact that Bennett and Ryle, on the other hand, obtained exactly identical curves in several instances when taken on different occasions. Bell and MacAdam state that as far as they are aware there is no published record of a series of fractional test meals carried out over a prolonged period in the same individual under constant conditions. For this reason they studied the variations in gastric response to the same test meal repeated under the same conditions on twenty consecutive days in a healthy subject. The investigations were carried out on a healthy man, aged thirty-one years, of good physique. The subject displayed an intelligent interest in the experiments and underwent the examination without any apprehension or discomfort. The fasting contents of the stomach were completely withdrawn and the test meal was given. Subsequently ten cubic centimetre specimens were withdrawn at intervals of a quarter of an hour for two and three-quarter hours. Salivation occurred, but measures were taken to prevent the saliva being swallowed. The charts drawn up by Bell and MacAdam from the results they obtained, illustrate clearly the points of similarity and the daily variations which occurred. As they point out, the first impression obtained on examining these charts is that they are very dissimilar. Closer examination shows that this is dependent on daily fluctuations in the acid values of the different fractions and that the remainder, except in two instances, show many points of similarity and are of the same type. The most interesting point is that the lowest curve of the series was that obtained on the first examination. Bell and MacAdam draw from this an important practical lesson. In the ordinary course of events this curve would have been accepted as representing the secretory activity of the individual's stomach. They think that the inhibition may have been due to psychic influences. They state that this observation points to a possible fallacy in the investigation of pathological conditions and they think that if on the first examination a hypochlorhydric or normal curve is obtained and more so if the clinical evidence suggests a higher curve of acidity, the test should undoubtedly be repeated before the possibility of a higher acid secretion is eliminated. They expected that the type of acid

[1] *The American Journal of the Medical Sciences*, April, 1924.

curve would present some constant characteristic feature, although it might differ in detail. This was so, for almost without exception the meal provoked an immediate abundant secretion of acid, the curve of acidity rose quickly to a considerable height and this was more or less maintained until the completion of digestion. Thereafter it fell quickly to a level approximating that of the fasting contents and this was followed by a slight rise which was maintained till the end of the test. Another interesting point shown in the charts is that the curves for free hydrochloric acid and total acidity bear the same relation to each other throughout the series. Bell and MacAdam state that experience in fractional gastric analysis soon teaches the observer the folly of laying stress upon slight deviations in the curves and leads him to rely more on the type of curve taken as a whole.

Two more observations of interest in this work should be noted. In the first place it was found that the rate of emptying of the stomach was remarkably constant throughout the observation and this was confirmed by radiological examination. In the second place different kinds of test meal were employed. It was found that the "tea and toast" meal provoked a slightly greater acid secretion than the average one obtained with oatmeal gruel.

THE RECTAL ADMINISTRATION OF "ARSPHENAMIN."

THERE are several methods of administration of drugs commonly used in the treatment of patients. Drugs may be injected into the circulation of into the subcutaneous tissues. Their therapeutic effect may sometimes be gained by injection into serous cavities. They may occasionally be absorbed from the skin when mixed with some fatty substance. They may be given by mouth or by the rectum in the form of suppositories or enemata. The method employed will depend on the nature of the drug, on the particular pathological condition for which it is being used or on some peculiar characteristic or idiosyncrasy of the patient. Rectal administration may be chosen for any of these reasons. Its adoption in the administration of arsenobenzol derivatives in the treatment of active syphilitic lesions has been repeatedly attempted. The advantages claimed for this method by most of its advocates are several. They include: Ease of administration, especially in children and those whose veins are hard to find; absence of reaction and untoward result and equal curative value to that obtained by the adoption of other methods. Boyd and Joseph reported the results of their observations in this direction in 1918. They pointed out that subcutaneous injections of "Arsphenamin" caused much pain and that in many persons it was impossible to find suitable veins without open dissection. This was not always desirable when the injections had to be repeated. Boyd and Joseph prepared the drug in the same way as for intravenous injection. They used twenty-five to fifty cubic centimetres of fluid for "Neo-Arsphenamin" and one hundred cubic centimetres for "Arsphenamin." They were not always able to produce an absence of reaction to the Wassermann test by rectal administration, but stated that they were interested chiefly in clinical improvement in the symptoms and improvement in the general health. They found improvement as a rule after from three to five injections. They further stated that they tried during these "Arsphenamin" courses to eliminate other forms of anti-syphilitic treatment. They did not state that they succeeded in doing so. This indefinite statement and the incomplete nature of the results make it appear that there was no justification for their conclusion that rectal administration offered the same curative value as the intravenous injection.

The question has lately been reopened by Dr. Sidney Littman and Dr. J. G. Hutton.[1] They refer to the conclusions of Benoit and also of Azemar that administration of "Arsphenamin" by the intravenous route was more effective than by rectal injection. They also state that the amounts of arsenic discovered by Mehrtens after rectal injection were found to be too small to act as criteria. Mandrachia, on the other hand, reported definite improvement after rectal dosage with "Arsphenamin" and concluded that administration by retention enemata was a successful and practical method of giving the drug. In the investigations of Littman and Hutton children with active manifestations of congenital syphilis were made the subject of experimental observation. In all instances "Arsphenamin," alkalized in the usual manner, was given by enteroclysis following a cleansing enema. The dose used was three times the usual intravenous amount of 0.01 gramme per kilogram of body weight administered in one hundred cubic centimetres of distilled water. Practically complete retention of the solution was effected by the addition of a small dose of tincture of laudanum. The case reports published by Littman and Hutton make interesting reading. But little improvement occurred as a rule during or after the rectal administration of the drug. No other treatment was used in conjunction with the rectal method. When intravenous administration was adopted improvement which was definite and rapid, occurred in every instance. In view of the claims made for one proprietary remedy known as "Supsalvs" this form of the drug was used. It was administered in a more intensive way than that recommended by its proprietors. In some instances remissions or improvement in lesions was noticed, but these were generally accompanied by the occurrence of fresh lesions in another place.

This work is of interest in view of the fact stated in an editorial comment on Littman and Hutton's work in the journal containing the article that the medical profession in America is being circularized in an endeavour to secure sale for proprietary "Arsphenamin" suppositories. It is not unlikely that this may be tried in Australia.

[1] *The Journal of the American Medical Association*, March 15, 1924.

Abstracts from Current Medical Literature.

DERMATOLOGY.

Arsenic Resistant Spirochæta Pallida.

J. V. KLAUDER (*Archives of Dermatology and Syphilology*, April, 1924) reports experiments in the production of a drug fast strain of *Spirochæta pallida*. He refers to the work of Akatsu and Noguchi who found that *Spirochæta pallida* and *Spirochæta microdentium* could be made to increase their tolerance to "Arsphenamin" and "Neo-arsphenamin within three or four months five and one-half times. The general plan of the author's experiments was to allow *Spirochæta pallidæ* to accustom themselves gradually to the action of arsenic by injecting into rabbits with active syphilitic lesions, a very small dose of "Arsphenamin," transplanting the organism to other animals, increasing slightly the dose and repeating the process until the amount of the drug was reached which constitutes the therapeutically active dose and that amount of "Arspnenamin" constituting the curative dose in animals not so treated. From the results of the experiments the author shows that the resistance to arsenic of the strain of *Spirochæta pallida* was increased to a maximum of 68%. The experiments also served to demonstrate that the strain of *Spirochæta pallida* showing increased resistance to arsenic was not resistant to the spirochæticidal action of bismuth.

"Arsphenamin" Eruptions.

EDWARD AHLSWEDE (*Archives of Dermatology and Syphilology*, April, 1924) calls attention to "Arsphenamin" eruptions resembling *lichen planus*. Several other authors have reported cases which were based on the same observations. In each instance a lichenoid eruption had developed either during the course or after a course of "Arsphenamin" treatment. The eruptions were generally in the skin, occasionally in the mucosa. These disturbances are probably a reaction to an irritation of the skin which causes a tendency to develope *lichen planus*. In summarizing these clinical experiences Ahlswede states that he believes that a uniform conception of the nature of lichen can be obtained only by making the patient's diathesis and the constitution of the skin responsible for the development of lichen. In a case of lichen the nervous factor predominates. The action is reflex and explains the appearance of lichen after gastro-intestinal disturbance, gall stones, the pressure of a truss *et cetera*. The assumption of a vegetative neurosis would also explain why lichen is frequently hereditary and runs in families and would also explain why in one instance "Arsphenamin" medication leads to a lichenoid eruption and in the other to the development of the true *lichen planus*. Both forms are closely related as to their genesis.

Diabetic Dermatitis.

WILLIAM D. DAVIS AND THOMAS J. CALHOUN (*Archives of Dermatology and Syphilology*, March, 1924) report an instance of diabetic dermatitis treated with "Insulin." For two weeks the patient received ten units of "Insulin" twice daily followed by two weeks in which she received ten units once daily. After one month's treatment the patient was discharged as clinically cured.

Dermatitis and Eczema.

W. J. HIGHMAN (*Archives of Dermatology and Syphilology*, March, 1924) states that for the production of eczema and most skin diseases three important links are necessary: The group of underlying causes, the group of local causes and the group of precipitating causes. Among the underlying causes are disturbances of nitrogen, carbohydrate and fat metabolism. The second group consists of endocrine disturbances chiefly of the thyreoid and suprarenal glands. The third underlying cause is due to the phenomena of susceptibility and idiosyncrasy embracing anaphylaxis. A subsidiary group of underlying causes are those due to malignancy and inanition, focal infections and bacterial intoxication. The local causes are anatomical and include the mucocutaneous functions, body folds, the hair distribution in these folds or elsewhere. The local causes may be functional and include the pilosebaceous or sudorific systems. The local causes may be physiological, such as ichthyosis, hyperidrosis, steatosis or the effect of previous general or local disease on the anatomy. Finally, there is allergy. The precipitating causes are physical, chemical, parasitic and anaphylactic. The precipitants remain innocuous unless conveyed to the vulnerable tissue which is influenced by qualities of environment, habit or occupation. Should the underlying disturbance be metabolic, substances may be eliminated in the skin secretions whose very presence furnishes irritants capable of acting as precipitating causes on a susceptible integument. Eczema, therefore, according to Highman, is the result of inter-operation among underlying local and precipitating forces.

Pemphigus Vulgaris.

GEORGE W. COVEY (*Archives of Dermatology and Syphilology*, March, 1924), reporting an instance of *pemphigus vulgaris*, draws attention to the histo-pathology of the spinal cord. The skin lesion in this disease directed his attention to the spinal cord. The dorsal roots or the dorsal root ganglia are possible points of attack and the manifestation of trophic disturbance may be a result of injury to the sensory nerve supply. The author found a definite gross and microscopical pathological condition in the suspected areas. It is easy to conceive that this condition might cause sufficient injury to the sensory nerves to result in such trophic disturbances. Several other authors have reported definite pathological changes in the cord involving chiefly the dorsal region.

"Arsphenamin" Therapy.

JOHN A. K. KOLMER AND BALDWIN LUCKE (*Achives of Dermatology and Syphilology*, March, 1924) in further studies on the results of large doses of "Arsphenamin" and "Neo-Arsphenamin" found that there were great individual variations in the histological changes produced in different animals. The differences may have been due to differences in susceptibility of the animals and to the slight differences in the toxicity of the preparations employed. They found that "Arsphenamin" appears to be relatively more hepatotoxic and "Neo-Arsphenamin" relatively more nephrotoxic. Consequently the former compound should not be used in people with clinical evidence of disease of the liver. On the other hand, "Arsphenamin" would appear to be the safer compound in patients with evidence of renal disease. Both compounds appear to cause more or less definite vascular changes consisting of swelling of the endothelial lining and of agglutination and partial fusion of the red cells.

Prognosis of Syphilis.

T. A. FORDYCE (*Archives of Dermatology and Syphilology*, September, 1923) believes that patients with primary syphilitic lesions, if the serum has not reacted to the Wassermann test, can generally be certain of cure with intensive treatment consisting of eight "Arsphenamin" and fifteen mercury injections for two courses. After the serum has reacted to the Wassermann test, a cure is possible with thorough treatment long continued, even though absence of reaction to the Wassermann test occurs early. Such patients may require intra-spinal treatment. Symptomatic cure can be obtained in tertiary and latent forms by several courses of "Arsphenamin" with mercury and iodides. Neuro-syphilis, especially in the degenerative stages of tabes, has not a favourable prognosis, although adequate treatment, including intra-spinal therapy, in the early stages will generally cure patients with early involvement. Improper treatment in these patients may result in tabes and paresis. The prognosis of congenital syphilis is less favourable than in the acquired form. In regard to marriage absence of response to the Wassermann test applied to the blood and spinal fluid for one or two years after adequate treatment should be required before consent to marriage is given. In exceptional cases response to the Wassermann test may not prevent such consent being given.

RADIOLOGY.

Hyperthyreoidism.

K. DUNHAM AND J. SKLAVEM (*American Journal of Roentgenology and Radium Therapy*, March, 1924) discuss the control of hyperthyreoidism. The condition is not a simple local affection of the thyreoid gland, but is a generalized neuro-endocrine dysfunction in which the thyreoid enlargement is an incident. Correct diagnosis must precede treatment. Foci of infection in the teeth, tonsils, sinuses, lungs, bowels and genito-urinary system must be sought for and suitably treated before radiation. Goitres are suitably classified as toxic and non-toxic. The simple colloid goitres are surgical conditions as also are the adenomatous ones. The basal metabolism rate is extremely high, but rapidly returns to normal with radiation, possibly combined with the administration of Lugol's solution as practised in the Mayo Clinic. Constant encouragement and cheer is necessary and positive assurance of relief is of great help to these nervous subjects. Rest and sleep are very essential and graduated exercises should be undertaken. Technique employed is as follows: A spark gap of twenty-two and a half centimetres (nine inches) is used with five milliampères of current, a thirty centimetre (twelve inch) distance aluminium filter and seven minutes' exposure. The thyreoid and thymus are covered by these areas and treatment repeated every three weeks until cure results. It is not possible to state how many treatments will be necessary.

Healed Miliary Tuberculosis.

EDWARD S. BLAINE (*American Journal of Roentgenology and Radium Therapy*, March, 1924) refers to an unusual appearance sometimes seen in skiagrams of the chest in which the whole of the lung fields are studded with numerous shot-like shadows. These multiple shadows are rounded in outline and of considerable density. They have sharply defined edges and are of small diameter (three millimeters at most). The lung areas between these shadows are normal in appearance. There is no tendenecy to coalescence or merging of shadows, nor has any fibrosis been noted. The distribution is identical with that of acute miliary tubercles, but the latter are hazy in outline and not so dense. The condition is the result of healing of a miliary tuberculosis accompanied by calcification necrosis of the individual tubercles.

Spondylo-Listhesis.

W. B. BOWMAN (*American Journal of Roentgenology and Radium Therapy*, March, 1924) refers to the forward and downward dislocation of the last lumbar vertebra on the first sacral body. The condition is known as spondylo-listhesis. The author states that the condition is not uncommon, is present in many injuries of the lower portion of the back and is not usually recognized owing to the difficulty in getting good lateral skiagrams in this region. Most cases follow a fall, but some followed on lifting heavy loads when "something gave way." Lateral skiagrams are necessary for diagnosis. A pad may be placed under the lower portion of the chest and loin to keep the lumbar spine level. A small cone diaphragm is used and the central rays are directed through the lumbo-sacral joint.

Infective Arthritis.

C. L. HUSTEAD (*American Journal of Radiology*, December, 1923) reports a case of infectious arthritis of the elbow. He describes an infectious arthritis as one due to bacteria or their toxic products and occurring as a complication of acute infections as well as of local diseases of the ear, teeth or abdominal organs. Sudden onset is noted with swelling, pain and loss of function and later deformity. Glandular enlargement and secondary anæmia with temperature, fast pulse *et cetera* occur. The joint may become distended with serum or pus. A syphilitic arthritis may be an early secondary phenomenon even appearing before the roseola. Tuberculous arthritis is generally gradual in onset and usually there is a tuberculous focus elsewhere in the body. Gonococcal arthritis follows infections by the gonococcus and the original source of infection can be located. Acute rheumatic infections are polyarticular and symptoms and signs may fly from joint to joint. In all cases the source of infection should be sought and suitably treated. The X-ray examination shows the articular surfaces to be hazy, indistinct and roughened with evidence of effusion into the joint.

Dislocation of Pisiform Bone.

J. H. MATHER reports a case of dislocation of the pisiform bone (*The British Journal of Radiology*, January, 1924). Such dislocation may be due to muscular violence or to direct violence. The patient was a female, aged twenty years, with a history of feeling something "give" when lifting a heavy weight. This was followed by pain on using the wrist. There was slight swelling over the region of the pisiform bone with tenderness on palpation. The skiagram showed that the pisiform bone had been displaced upwards and was situated between the cuneiform and the lower extremity of the ulna. The displacement could also be seen by lateral examination. Treatment in flexion for three weeks proved unsuccessful and the bone was then excised and at the end of five weeks there was complete return of function without pain.

Annular Lung Shadows.

G. T. HERBERT draws attention to the annular shadows so often seen in pulmonary tuberculosis (*Tubercle*, February, 1924). These shadows may be single or multiple and vary in size. The usual appearance is that of a ring of more or less crenated outline varying from one and a half to eight millimetres (one-sixteenth to one-third of an inch) and enclosing a circular or oval space of from two and a half to seven and a half centimetres (one to three inches) in diameter. Some observers look upon them as localized pleury, but most observers regard them as cavities. The suggestion that they are due to localized pneumothoraces has not met with much support. The author describes an instance in which the appearance were undoubtedly due to pleural lesions and he mentions another instance in which an annular shadow was present before death and the shadow at autopsy proved to be due to cavitation with tough fibrous walls.

Atypical Pregnancies.

DAVIS SPANGLER (*American Journal of Roentgenology and Radium Therapy*, March, 1924) draws attention to the value of X-rays in the diagnosis of atypical pregnancies with a report of two cases of anencephaly diagnosed before birth. He notes that many obstetricians hesitate to submit the pregnant woman to Röntgenographic examination because of supposed danger to the fœtus; no such danger exists. The fœtus is demonstrable after the fifth month, but the age of the fœtus cannot be determined from X-ray examination. The various pelvic diameters may be readily estimated and also the size of the head in relation to the inlet and outlet. Stereoscopic plates are also of value in this respect. Twin pregnancies can be readily diagnosed and the positions known before birth. Every Cæsarean section should be preceded by X-ray examination and this prevents embarrassment of delivery by section of a monster, a dead fœtus or an extremely small child. In the case of a dead fœtus the author looks for overlapping of the cranial bones.

Acute Mediastinal Abscess.

ORRIN S. COOK describes four cases of acute mediastinal abscess occurring in children (*American Journal of Roentgenology*, September, 1923). Very little has been written on this condition except in that type of condition known as cold abscess which is associated with tuberculosis of the spine. The first instance followed broncho-pneumonia in a patient who apparently was cured, but later developed fever of a septic type. Skiagrams revealed dulness to the right of the mediastinum and continuous with the heart shadow; the dull area had a sharply defined outer border fading away, however, in its upper part. Resection of the tenth rib near the spine was carried out and a large abscess drained. The other three patients give a similar history. One of them developed mediastinal abscess after drainage of an empyema and in this instance the mediastinal mass disappeared after the child had coughed up a large amount of pus.

Medical Societies.

THE ALFRED HOSPITAL CLINICAL SOCIETY.

A MEETING OF THE ALFRED HOSPITAL CLINICAL SOCIETY was held at the Alfred Hospital, Melbourne, on April 29, 1924, DR. J. P. MAJOR, the PRESIDENT, in the chair.

Subacute Bacterial Endocartitis.

DR. M. D. SILBERBERG showed a man, aged thirty-six years, who had had four attacks of rheumatic fever at eleven, twenty-two, twenty-eight and thirty-four years of age. He had known for fourteen years that his heart was affected. His complexion was described as "*café au lait*." Examination revealed the presence of a "Corrigan" pulse. Capillary pulsation was present, the fingers were clubbed, the nail beds were thickened and a few petechiæ were present on the arms. The heart was very large, the apex beat was situated thirteen centimetres from the middle line. The aorta was dilated, dulness was present over an area extending for fourteen centimetres from the right to the left side of the sternum. A definite aortic systolic thrill was present as well as an aortic systolic bruit which was very rough and could be heard without a stethoscope at a distance of one and a half centimetres from the chest wall. There was also audible an aortic diastolic bruit. Both bruits were widely conducted. The blood serum had not reacted to the Wassermann test. Dr. Silberberg regarded the case as one of subacute bacterial endocarditis on a rheumatic aortic valvulitis and dilated aorta. He referred to the occasional occurrence of clubbing of the fingers before definite signs of endocarditis were apparent.

DR. A. V. M. ANDERSON suggested that cultural investigation should be undertaken.

Disseminated Sclerosis.

DR. WALTER SUMMONS showed a man, aged thirty-two years, whom he had first seen one month previously complaining of loss of power in all his limbs. This had been developing during the preceding six weeks. The patient had been unable to go up steps and had experienced great difficulty in rising from the sitting posture. At the onset he had experienced general pains and these had almost disappeared. Sixteen years previously the patient had been operated on for a depressed fracture of the skull. The general health was good. The patient had been a miner, but no changes had been detected in his lungs. His weight had been reduced in four weeks from sixty kilograms (one hundred and thirty-four pounds) to 51.7 kilograms (one hundred and fifteen pounds). He was impotent. His blood serum had not reacted to the Wassermann test. The urine had been normal. Examination at the time of demonstration showed obvious loss of power and wasting, though this was not confined to any particular group of muscles. The tendon phenomena were active in all four extremities, clonus was present in the legs and equal on both sodes of the body. The plantar reflex was flexor in type on the left and extensor in type on the right side. The abdominal reflexes were variable. Dr. Summons explained that on one occasion they had been completely absent. Sensation was normal and acute to all forms of stimuli. The eyes reacted to light and accommodation. Definite nystagmus was present and the tongue was tremulous. Neither intention tremor nor ataxia were present. All the muscles responded to Faradism. The patient stated that he was improving under treatment which consisted in the administration of tonics and iodide of potassium, but there was no change in the signs.

Dr. Summons said that he presented the patient as probably suffering from disseminated sclerosis. He had also considered the possibility of lead poisoning as the man had latterly been employed as a plumber.

DR. JOSEPH LOVE recognized this patient as a man whom he had treated twelve years previously subsequent to a mining accident in which the patient had been buried. He had then suffered from carbon monoxide poisoning and for three months spectroscopic examination of his blood had revealed the presence of the characteristic bands of carbon monoxide hæmoglobin. For eighteen months the patient had been very anæmic. Dr. Love referred to the possibility of the occurrence of various degenerations of the nervous system following carbon monoxide poisoning and to the fact that such degenerations might possibly be delayed.

DR. A. V. M. ANDERSON remarked on the absence of spasticity in this patient. He suggested that further investigations should be undertaken in regard to the possibility of lead poisoning.

Ulceration of the Tongue.

Dr. Summons also showed a female patient, aged thirty-four years, single, with ulceration of the fauces and tongue which had been present with a few intermissions for fourteen years. At the time of demonstration it could be seen that generalized scarring of the affected parts was present together with three ulcers, one on the side of the tongue, one underneath the tongue and one near its tip. A direct smear had shown the presence only of pus cells, diplococci, staphylococci and streptococci. The patient had refused to allow excision of a small piece of tissue for microscopical examination. The spleen was enlarged for a distance of two fingers' breadth below the costal margin. Examination of the blood had shown that the erythrocytes numbered five million and the leucocytes eight thousand per cubic millimetre, that the hæmoglobin value was 70% and the colour index 0.7. The Wassermann test had been carried out on several occasions, but no reaction had been obtained. The patient had had two courses of W——— A——— B——— injections without benefit. Investigation of the family history revealed that one brother had been accidentally drowned and that her mother had died of hydatid disease. The patient had had a "nervous breakdown" four and a half years previously, otherwise there was nothing to be noted in the history or examination.

DR. SPALDING LAURIE suggested the possibility of the dental plate being the cause of the ulceration.

DR. M. D. SILBERBERG stated that he understood that an aluminium plate had been known to cause ulceration.

DR. J. P. MAJOR considered the possibility of the presence of syphilis in view of the enlarged spleen and referred to similar cases in the literature in which the local condition had not improved until the spleen had been removed.

Abdominal Tumour and Multiple Lipomata.

DR. G. A. BIRNIE showed a woman with an abdominal tumour which had been present to her knowledge for thirty years. She stated that though she had never felt very robust, she had not had any serious illness. She had consulted medical practitioners at various times on account of a feeling of fullness and weight. As far as she knew, there had been no variation in the size of the tumour. She had not jaundiced and had not suffered from any hæmorrhages. She had had a fall two months previously and since that time had felt weak and had been unable to go about her household duties in the accustomed fashion. She complained of a sensation of tightness across the abdomen and of some loss of weight. She had had three children and one miscarriage. Examination revealed the presence of a freely movable tumour to the left of the middle line, extending below the umbilicus and measuring about twenty-five by eighteen centimetres The hand could be tucked in between the left costal margin and the tumour which could be moved about either upwards, downwards or across the middle line. Vaginal examination had not disclosed any relationship between the pelvic organs and the tumour. Multiple lipomata were present throughout the body. Examination of the blood had revealed a normal picture. No reaction had been obtained to the Wassermann test or to the complement deviation test for hydatid. The urine contained no albumin. The arteries were thickened and the systolic blood pressure was two hundred and twenty millimetres of mercury. The patient had been told on a number of occasions that she had an enlarged spleen, but the history and examination were both against this diagnosis.

DR. ROBERT FOWLER suggested the possibility of the tumour being of renal origin, he did not consider that it was the spleen and he said that tumours of pelvic origin of the size of this one tended to keep to the middle line of the abdomen. The same was true in regard to retro-peritoneal cysts in the upper portion of the abdomen.

DR. A. V. M. ANDERSON supported this diagnosis and suggested that cystoscopic examination should be made.

DR. M. D. SILBERBERG suggested the possibility of the tumour being an enlarged spleen dislocated by the fall. On the other hand, a renal origin was suggested by the condition of the arteries and by the high blood pressure. He emphasized the value of a cystoscopic examination with ureteral catheterization.

Exophthalmos.

DR. J. E. GILLESPIE showed a female patient, aged sixty-five years, who had been under treatment in the Out-Patient Department at intervals for the previous two years on account of chronic bronchitis with attacks of palpitation and dyspnœa. The blood pressure was one hundred and fifty-eight to one hundred millimetres of mercury and there was a systolic bruit at the apex and base of the heart. Six months previously she had complained of insomnia and two months after that she had noticed that the eyes were becoming prominent. There had been some degree of tachycardia, but no tremor until five weeks previously when a slight tremor in the hands had been noticed. She had complained of feeling "weak and aching all over." The eyes had become steadily more prominent. The fundi had been normal and there had been no evidence of orbital tumour. Von Graefe's sign had been elicited. Abduction of the eyes to the left had been defective. The serum had reacted to the Wassermann test. Dr. Gillespie pointed out that the symptoms had quietened down and that the patient was feeling much better; the exophthalmos, however, appeared to be increasing. There was no evidence of enlargement of the thyreoid gland. The patient had had a similar attack eight months previously and this had rapidly subsided. Dr. Gillespie considered that the condition was due to hyperthyreoidism.

DR. W. S. NEWTON instanced cases of hyperthyreoidism in which exophthalmos had preceded other signs.

DR. R. FOWLER referred to a case seen in obstetric practice in which exophthalmos had appeared on the second day of the puerperium and had disappeared in the course of a few days.

DR. W. SUMMONS referred to instances during the war in which certain men after severe fighting had developed an acute condition of exophthalmos.

Spina Bifida Occulta.

DR. JOSEPH LOVE showed a man, aged twenty-five years, a labourer, who complained of difficulty in controlling micturition for the previous three months. Frequency had been extreme both during the day and night. There had been no strangury, no difficulty in passing urine and no urethral discharge. He had had pains and stiffness in the legs for the previous three years and this had interfered somewhat with walking. Examination revealed a well-grown youth. The lumbar curve of the back was almost obliterated, the sacrum was prominent and convex. There was slight wasting of the left gluteal region and of the muscles of the left thigh and leg. The left lower extremity was one and a quarter centimetre (half an inch) less in circumference than the right. Movements of flexion and extension of the trunk were very limited, but lateral movements of the trunk were good. The *erector spinæ* and glutei muscles were held in spasm. There was no definite motor paralysis. There was a certain amount of lessening and confusion of sensation over the saddle area of the fourth and fifth sacral nerves extending down the back of the left thigh for about fifteen centimetres (six inches) and also at the lower part of the left leg. There was anæsthesia. There was definite localized tenderness over the fifth lumbar and first sacral vertebræ. The knee jerks were present on both sides and were very active. The ankle jerks were absent on both sides. The plantar reflexes were flexor in type though somewhat difficult to obtain. Examination of the cranial nerves revealed no abnormality, there was no change in the voice and no Rombergism. The bladder was tonically contracted and there was constant dribbling of urine in which no abnormal constituent was discovered. The large bowel was loaded with fæces. Constipation had been absolute for several weeks until five days previously and since then the bowels had been opened a little every day. The blood serum had not reacted to the Wassermann test. Dr. Love showed a skiagram of the lower portion of the spine and sacral region. The radiologist had reported that this showed nothing which could not be regarded as coming within the limits of normality. Dr. Love said that he had submitted this patient for suggestions as to diagnosis and treatment.

DR. F. KINGSLEY NORRIS considered that it was a case of *spina bifida occulta*. Notwithstanding the radiologist's report it seemed to him that there was a definite deficiency in the neural arches.

Anterior Polio-Myelitis.

DR. W. S. NEWTON showed a female patient, aged eighteen years, who had been admitted to the Melbourne Hospital two and a half years previously suffering from a sore throat, general malaise and subsequently with loss of power in the right leg. This had been followed by similar loss of power in the left leg and left arm. On admission the temperature had been 38.9° C. (102° F.). This had persisted for two days and the patient had then remained afebrile. The arm had commenced to recover three weeks after the onset and at the time of demonstration had recovered completely with the exception of some wasting of the small muscles of the thumb. There was also complete loss of power in both legs. There was no sphincteric involvement. The glutei were still active. He considered the condition was due to anterior poliomyelitis and invited suggestions as to treatment.

DR. F. KINGSLEY NORRIS agreed with the diagnosis and said that he regarded the case as an atypical one. He discussed the possibility of enabling the patient to walk with Thomas's calipers.

DR. SPALDING LAURIE recalled a similar case in which deformities had developed.

DR. SUMMONS did not think that any apparatus would fix the lower joints of the limbs and allow the weight of the body to be carried.

Hydatid of the Lung.

DR. J. P. MAJOR showed a man, aged twenty years, who gave a history of hæmoptysis two years and of left-sided pleurisy eight months previously. Four months before demonstration he had suffered from broncho-pneumonia and since that time he had complained of cough, weakness and dyspnœa on exertion. No loss of weight had occurred. On examination the patient was seen to be slightly cyanosed. The right side of the chest was bulging and almost immobile; it was dull on percussion except at the apex in front and the upper five to eight centimetres posteriorly. Over the area of dulness the vesicular murmur was practically absent. Radiographic examination revealed a large tumour filling practically the whole of the right side of the chest. Dr. Major considered the condition to be one of pulmonary hydatid.

At operation some days later this diagnosis was confirmed.

MELBOURNE PÆDIATRIC SOCIETY.

A MEETING OF THE MELBOURNE PÆDIATRIC SOCIETY was held at the Children's Hospital on May 14, 1924, DR. R. M. DOWNES, C.M.G., the PRESIDENT, in the chair.

Familial Amyotonia Congenita.

DR. H. DOUGLAS STEPHENS presented a female infant, aged thirteen months, whom he regarded as furnishing an example of familial *amyotonia congenita*. The baby's parents had become anxious about her because, as they

expressed it, the "muscles did not seem to have any strength"; they had noted that the child was unable to sit up for long, made no attempt to crawl and could not carry anything to her mouth. She had been born at full term, but labour was difficult and instrumental delivery was found necessary. Naturally fed for the first five months, she had subsequently been given "humanized" milk. At the time of demonstration she was much under weight. The infant appeared intelligent, recognized different people and could say simple mono- and di-syllabic words. Her weight was 9.3 kilograms. The circumference of the head measured forty-six and a half centimetres and a narrow bi-temporal diameter was a conspicuous feature in the configuration of the head.

Dr. Stephens demonstrated that muscular atonia was general. The child easily slipped through the fingers when she was grasped in the axillary region. She was round-backed in the dorsal region and was unable to lift her legs from the bed. Neither the quadriceps extensor, deep tendon reflexes nor the superficial abdominal reflexes could be elicited. He had been unable to detect any signs indicative of the existence of *spinæ bifida occulta*.

Another child of this family had been brought to him two years previously exhibiting a similar condition of muscular atonia. In that case respiration had been maintained almost entirely by the diaphragmatic movements as the intercostal muscles were affected by the general atony. The child had not lived very long and succumbed to broncho-pneumonia.

In regard to the child he had presented Dr. Stephens entered into a discussion of the Oppenheim and Werdnig-Hoffmann types of muscular atony. He did not consider that either of the two children of this family conformed to the more usual Oppenheim variety, in which he had never observed the narrow bi-temporal diameter. It was a question whether they would not be more correctly classified as belonging to the Werdnig-Hoffmann type in which the pathological basis was an early infantile spinal atrophy.

Familial Hæmolytic Splenomegaly.

Dr. Stephens's second patient was a boy, aged eight years, who during the previous four years had suffered periodic attacks of malaise. The attacks had occurred chiefly during the winter months, were of about fourteen days' duration and their principal features were pallor and languor, jaundice, fever and occasionally vomiting.

On physical examination the boy was seen to display a distinct icteroid tinge in the conjunctivæ and general pallor. The abdomen was slightly distended and an enlarged spleen, the edge and notches of which were readily palpable, was apparent. The lower margin of the liver was located as two centimetres below the costal margin.

The family consisted of three boys other than the patient, aged respectively six and a half years, three years and nine months. A definitely enlarged spleen was present in all the brothers. Eight months previously the mother had been subjected to splenectomy for the relief of jaundice and anæmia associated with enlargement of the spleen and she had since been very well.

In the case of the boy under discussion it had been determined that the red corpuscles numbered 3,960,000 per cubic millimetre, the leucocytes 13,7000 per cubic millimetre. Hæmoglobin was estimated at 65%. A slight degree of anisocytosis and polychromatophilia was noted in the red corpuscles. The relative proportions of the several varieties of leucocytes present were found to be: Neutrophile polymorpho-nuclear cells 49.2%; large lymphocytes 45%; small lymphocytes 4%; transitional cells 1.6%; myelocytes 0.2%. In the estimation of the fragility of the red corpuscles it was found that hæmolysis occurred in a dilution of saline solution as high as 0.55%, while the corpuscles of a normal individual used as control resisted hæmolysis in saline solutions about 0.45%. No bile pigment or urobilin could be detected in the urine. When the Van den Bergh test was applied to the blood serum, no reaction, immediate, delayed or bi-phasic was obtained by the direct method. By the indirect test a positive reaction was obtained. The Wassermann reaction as applied to the blood serum afforded no evidence of syphilitic infection.

Splenectomy had been performed on April 17, 1924. The spleen was much enlarged but there had been no adhesions to cause embarrassment. Recovery had been uneventful and the boy had been discharged from hospital on May 5, 1924.

The laboratory investigation before and after operation had been carried out by Dr. B. L. Stanton who had supplied the accompanying tables in which his results are summarized.

At the time of demonstration the boy was very well and had lost the icteroid tinge in his complexion. By an examination made on May 1, Dr. Stanton had determined that the undue fragility of the erythrocytes had not been modified by splenectomy.

Scoliosis.

In the third instance Dr. Stephens showed a girl, aged nine years, affected by scoliosis. There was an S-shaped curvature of the spine convex to the right in the upper thoracic segment and to the left in the lower thoracic and lumbar regions. The mother had first noticed deformity about eight months previously and at that time the girl had recently recovered from pneumonia. The pneumonia had not been complicated by empyema.

Dr. Stephens exhibited radiograms of the spinal column and said that he regarded the scoliosis as of structural type. He proposed to fit the child with a Lovett's jacket in the first place and later to apply a removable jacket and institute massage and exercise.

TABLE I.

Date.	Red Blood Cells per Cubic Millimetre.	Abnormality of Red Cells.	Hæmoglobin Value.
April 7	3,960,000	Slight anistocytosis and polychromasia	65%
April 17[1]	4,360,000	Anisocytosis, polychromasia, stippling	95%
April 19	4,000,000	Anisocytosis, stippling more frequent	90%
April 20	—	Anisocytosis, polychromasia, stippling	—
April 21	—	Stippling infrequent, otherwise the same	—
April 22	4,950,000	Anisocytosis, many Howell-Jolly bodies	100%
	—	Howell-Jolly bodies, no polychromasia	—

[1] Splenectomy.

TABLE II.—CHART SHOWING PERCENTAGES OF LEUCOCYTES AND ABSOLUTE NUMBERS PER CUBIC MILLIMETRE.

Date.	Total Count.	Neutrophile Cells.	Eosinophile Cells.	Basophile Cells.	Lympho-cytes.	Transitional Cells.	Myelo-cytes.
April 7 ..	13,700	6,165 = 45%	548 = 4%	27 = 0.2%	6,713 = 49%	219 = 1.6%	27 = 0.2%
April 17[1] ..	41,800	19,646 = 47%	2,090 = 5%	418 = 1%	17,135 = 41%	1,254 = 3%	1,254 = 3%
April 19 ..	33,500	29,021 = 86.6%	144 = 0.4%	0 0	1,005 = 3%	3,216 = 9.6%	144 = 0.4%
April 20 ..		76%	3%	0.2%	11.8%	7%	2%
April 21 ..		67%	7%	0.5%	12%	13%	0.5%
April 22 ..	20,500	12,197 = 59.5%	9,615 = 3%	205 = 1%	4,305 = 21%	2,972 = 14.5%	205 = 1%
April 23 ..	24,000	16,560 = 69%	960 = 4%	240 = 1%	3,840 = 16%	2,160 = 9%	205 = 1%

[1] Splenectomy.

In reply to comments by Dr. Kent Hughes who inclined to the view that the spinal curvature was an example of static scoliosis, Dr. Stephens said that he would not resort to a jacket in the treatment of postural scoliosis and for that condition favoured massage and active exercise.

Cœliac Disease.

DR. A. P. DERHAM discussed the case of a little boy, aged four years and nine months, who had first been sent to the Children's Hospital in September, 1921, having been regarded as probably tuberculous. He was then emaciated, afebrile and prone to attacks of vomiting after taking food. Puffiness of the hands and feet was also recorded. Inquiry had shown that the child had been fed with a mixed diet in which there was an excess of carbohydrate and that "Lipol" had been regularly administered for some time.

Treatment had been carried out on the lines appropriate for chronic non-infective entero-colitis and fat dyspepsia, the diet being adjusted so that it was rich in protein and relatively poor in fat and carbo-hydrate. The child had gained weight steadily and had been returned to the Neglected Children's Department whence he was boarded out.

In March, 1923, the child had again been brought to the Children's Hospital on account of decline in weight "in spite of good feeding." It had been ascertained that the "good feeding" comprised a great deal of patent food. Bleeding from the gums had been a conspicuous symptom at this time and under an anti-scorbutic régime the child's weight rose from 8.4 kilograms (March 3, 1923) to 10.5 kilograms (May 1, 1923). He had been again discharged from hospital and during the last twelve months had made but slow progress. His weight at the time of demonstration was 13.7 kilograms, but he was subject to repeated relapses of mal-digestion. At these periods the abdomen become much distended and frequent, large, relaxed, offensive, pallid or grey stools were passed. The motions became of more formed character at intervals, but were never of normal appearance. They had not exhibited the presence of undigested starch or gross excess of fat.

The child was a confirmed dirt-eater and was backward mentally and physically. He had displayed no irregularities of dentition. The Wassermann reaction applied to the blood serum did not disclose any evidence of syphilis and no response was obtained to the von Pirquet cutaneous tuberculin test.

The diet had been carefully supervised for the previous few months and, although the child seemed to improve in his general health, there had been no change in the abnormal character of the stools. For the previous sixteen days he had been given sodium taurocholate 0.6 gramme twice in the day and for the first time during the many months that he had been under observation the stools had definitely improved in colour and constituency.

Chronic Nephritis.

The case record of a girl, aged ten years, under the care of DR. J. W. GRIEVE was presented by DR. JEAN MCNAMARA.

The patient had been admitted to the medical wards of the Children's Hospital on March 21, 1924, for investigation of the origin of attacks which were characterized by fever, headache and vomiting. The clinical history showed that the child had suffered from measles at the age of three years and at two years had contracted an illness which was "followed by fits." At that time she had been treated by the administration of potassium citrate and a subsequent course of hexamine. Her mother had been told then that the child's kidneys were affected.

Although delicate in infancy she had been apparently healthy and well nourished from the end of her third year until she had become ill with pneumonia, twelve months previously. Since then she had not been strong and at intervals which were becoming shorter, she became febrile, could not retain her food and complained of headache. Occasionally she suffered severe pain in the right loin. She had lost much weight and was very easily tired. For the previous six months she had been troubled by nocturnal micturition.

To clinical examination she appeared as a somewhat puny and under-nourished girl and maintained a temperature which oscillated round 37.8° C. (100° F.). Slight tenderness in the region of the right kidney was elicited.

The daily quantity of urine was nine hundred to twelve twelve hundred cubic centimetres, the reaction acid and specific gravity 1010. Albumin was present in small amount. By microscopical examination the urine was found to contain pus cells and coliform bacilli in extremely large numbers and with these were associated epithelial cells and a few granular casts. A radiological examination for the detection of a possible renal calculus had been without result, and although the cutaneous tuberculin test led to no local reaction, a somewhat severe systemic reaction ensued on the injection of 0.005 cubic centimetre of old tuberculin.

On March 28, 1914, Dr. R. M. Downes had carried out a cystoscopic examination and observed that the bladder wall, in the region of the trigone was studded with small papillomatous nodules, resembling grains of tapioca in appearance. Specimens of urine had been secured from each ureter and in both pus cells and a few granular casts were found. No tubercle bacilli could be found in either specimen.

On April 9, 1924, a guinea pig had been inoculated with one cubic centimetre of the pus sedimented from a twenty-four hour specimen of urine, but although the animal died four weeks later from a cause which was not apparent. no evidence of tuberculous infection could be discovered at the autopsy.

The patient's systolic blood pressure was one hundred and eighty millimetres of mercury and on April 20 the reading was as high as two hundred and three, Dr. Stanton had carried out detailed investigations regarding the efficiency of renal function. He had estimtaed the blood urea by McLean's method as forty-eight milligrammes per one hundred cubic centimetres and the urea content of the urine at the same time was 1.05%. The urea concentration factor was therefore twenty-two. Urinary diastase was found to be 3.3 units. In the performance of the urea concentration test Dr. Stanton had found that the specimen of urine passed at the end of the second hour after the ingestion of fifteen grammes of urea contained 1.32% of urea.

By ophthalmoscopic examination it had been found that the outline of the optic disc in the right eye was ill-defined and that the vessels of the *fundus oculi* were distinctly thickened. In the left eye papillœdema was well established and a patch of exudate was to be seen above and to the temporal side of the disc.

Dr. McNamara said that she regarded this patient as of interest in view of the association of cysto-pyelitis of long standing with evidence of impaired renal efficiency.

Dr. J. W. Grieve proposed to adopt pyelography as a further diagnostic measure and in the absence of any gross hydronephrosis or other lesion to institute treatment by lavage of the renal pelvis as described by Dr. Gordon Craig at the Session of Congress held in November, 1923.

Hodgkin's Disease.

Dr. Grieve's second patient was a boy, aged six years, who had been apparently well until three months ago. The mother had then noticed for the first time a lump in the left axilla and had observed also that the main swelling was made up of several small lumps. She had sought advice as the swelling was increasing in size and the boy had become listless, tired and disinclined for play. On admission to hospital the boy's temperature had been recorded as 38.1° C.; he had been observed to be rather pallid and in poor nutrition.

A systolic bruit had been audible all over the præcordium, but had been heard best at the mitral area whence it was conducted to the left axilla. The edge of the liver had been palpable two and a half centimetres below the costal margin, but the spleen could not be demonstrated as enlarged.

There had been considerable glandular enlargement in the left axilla; the affected lymphatic glands had been soft, discrete and not adherent to the skin or deeper tissues.

Enlarged glands had been palpable under the costo-lateral border of the left *pectoralis major* muscle. There had not appeared to be any enlargement of the glands in the right ailla or o fthose in the inguinal regions.

The findings in the examination of the blood had been: Red blood cells, 4,840,000 per cubic millimetre; leucocytes, 15,000 per cubic millimetre; hæmoglobin, 80%. The red corpuscles had presented no abnormalities of shape or staining, but were lacking in uniformity of size. Neutrophile polymorpho-nuclear cells had comprised 70% of the leucocytes.

No result had been obtained by the Von Pirquet cutaneous test in the case of both human and bovine tuberculins.

The report on the sample of blood sent for examination by the Wessermann test had not as yet been received.

One of the affected glands had been excised and Dr. Webster's report was that the principal histological feature was a very striking proliferation of the endothelium of the reticulum. This was well observed both in the germ centres and throughout the rest of the gland and appeared to be recent and progressive. Multinucleate cells occurred, but in respect of these and in general character the section did not sugest tuberculosis. There was a possibility that the process was syphilitic, but he thought that it was most probably Hodgkin's disease.

Pellagra.

DR. R. R. WETTENHALL showed a boy in whom he had diagnosed pellagra.

DR. DOUGLAS GALBRAITH, who concurred in the diagnosis, read details of cases of pellagra which had come within his experience.

Pathological Specimens.

The meeting closed with an exhibition of pathological specimens by DR. REGINALD WEBSTER. The specimens were selected from the pathological museum of the Children's Hospital to illustrate anomalies in the urinary tract.

British Medical Association News.

NOTICES.

THE Honorary Secretary of the Section of Psychiatry and Neurology of the Victorian Branch of the British Medical Association informs us that the title of a paper to be read by Dr. W. A. T. Lind at a meeting of the Section on June 16, 1924, has been incorrectly given on the notice papers. It should read: "Report on Ten Cases of Epilola." The paper will be illustrated with lantern slides and brain sections.

NOMINATIONS AND ELECTIONS.

THE undermentioned have been nominated for election as members of the New South Wales Branch of the British Medical Association:

AIKEN, DAVID, M.B., F.R.C.S., 1909 (Edin.), Murwillumbah.

KINSELLA, VICTOR JOHN, M.B., Ch.M., 1923 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.

BACK, ROBERT FERGUS, M.B., Ch.M., 1923 (Univ. Sydney), West End, Petersham.

MOSS, HENRY ST. LEGER, M.B., Ch.M., 1922 (Univ. Sydney), Lindfield.

University Intelligence.

THE UNIVERSITY OF SYDNEY.

A MEETING of the Senate of the University of Sydney was held on June 2, 1924.

The degree of master of surgery was conferred upon Drs. T. M. Barnet and J. J. W. Flynn, B.A., *in absentia*.

A letter was received from Mr. G. T. East, of Toowoomba, Queensland, donating £50 towards the Cancer Research Fund. The gift was accepted, a letter of grateful thanks to be sent to the donor.

Professor C. E. Fawsitt (Dean of the Faculty of Science), Professor Sir Henry Barraclough (Acting Dean of the Faculty of Engineering) and Professor Sir Edgeworth David, were nominated as delegates of the University to the meeting of the Australian Association for the Advancement of Science to be held in Adelaide in August and September next.

The following were appointed Senate representatives to the University Sports Union Committee: Professor A. E. Mills, Professor Holme and Dr. G. H. Abbott.

The resignation of Dr. S. A. Smith as Medical Tutor at the Royal Prince Alfred Hospital, was received.

On the recommendation of the Faculty of Medicine the Walter and Eliza Hall Travelling Medical Fellowship, 1924, was awarded to John Gower Stephens, M.B., B.Sc.

Leave of absence for Trinity Term of the current year was unanimously granted to Professor J. I. Hunter (who occupies the Chair of Anatomy) to enable him to accompany Dr. N. D. Royle, of Sydney, to America. These gentlemen have been invited to deliver the Dr. John B. Murphy Oration at the Clinical Congress to be held in New York in October next. Dr. Franklin Martin, Director-General of the College of Surgeons, has asked Professor Hunter to contribute a commentary on the anatomical aspect of Dr. Royle's paper on spastic paralysis as part of the Oration. It was felt at the Senate meeting that the invitation to Professor Hunter and Dr. Royle is to be regarded as one of the greatest compliments paid by a renowned institute to a scientist as well as a great honour to the Medical School of the University of Sydney.

Public Health.

DIRECTOR-GENERAL OF PUBLIC HEALTH IN NEW SOUTH WALES.

THE office of Director-General of Public Health of New South Wales has recently become vacant on the retirement of Dr. W. G. Armstrong. The cabinet of New South Wales on June 4, 1924, confirmed the appointment of Dr. Robert Dick, who has held the position of Senior Medical Officer of Health until the date of his promotion. The valuable services of Dr. Armstrong in the several offices he has filled, including that of Director-General of Public Health, have been publicly recognized by the Chief Secretary of the State, Dr. Armstrong's colleagues and members of his staff. Unofficially it is universally realized that his work has been of a very high order and that the community of New South Wales was safe while the public health laws were administered by him. Dr. Dick is assured of the goodwill and hearty support of the medical profession in his responsible duties.

Correspondence.

HYPERTHYREOIDISM.

SIR: In your number of May 24, under the heading of current comment, an article appears on the thyreoid gland, in which a statement is made which is open to serious question. The writer states that "the excision of the thyreoid for Graves's disease is performed on the assumption that the condition is dependent on a pathological anomaly of that gland alone," and earlier he suggests that at the recent Australasian Medical Congress it was claimed that the surgeons had solved the riddle.

I listened carefully to the discussion at the Congress and do not think that this claim was made by anyone. What was claimed and I think quite fairly, was that the only

treatment which is widely accepted as of real value in the condition of exophthalmic goître is the surgical removal of a large portion of the thyreoid gland and that the procedure gives excellent results.

I have been unable in a fairly extensive study of the literature to find an account of any form of medical treatment which gives a satisfactory result in such cases, and though cures undoubtedly occur under medical treatment, it is doubtful whether they are more frequent than those which occur without any treatment at all. Again there is no accepted ætiology of this disease, no general agreement as to the actual organs primarily at fault and some observers doubt whether the thyreoid gland is primarily affected or not. What is clearly evident, however, is that surgical treatment in competent hands gives good, even brilliant results in a comparatively short space of time and no one with any experience of it can fail to have seen cases which looked sure to end fatally, in which the patient was through surgery restored to efficient life. This seems to be accepted all over the world as true and is the basis of the surgeon's claim. He does not claim to strike at the root of the disease or to have spoken the final word as to its treatment, but he may fairly claim to have perfected the only treatment which is accepted all over the world as efficient, reliable and safe, at least as compared with so-called medical treatment. Those who decry surgical treatment, should at least tell us what they suggest should be done in the meantime for the cases which we see every week.

Should we tell them to wait until a definite and reliable treatment is worked out on a sound pathology? Available statistics suggest that 15% to 25% of them will die of the disease, probably before that is done. Surely it is better to confess our ignorance and thankfully accept surgical aid which we know will restore over 90% of reasonably early cases to a state of efficiency in a comparatively short time. Meanwhile an immense amount of work is being done in the endeavour to solve the problem of causation which may give us a sound medical treatment, but as Dr. Marine freely admits that solution is still to come.

It is of interest to note that at Rochester, where some of the acknowledged leaders in this field work, surgery is the universal treatment for exophthalmic goître.

Yours, etc.,

H. HUME TURNBULL.

85, Spring Street, Melbourne,
June 2, 1924.

[The object of the article referred to is expressed in the title: "The Applied Physiology of the Thyreoid Gland." Dr. Turnbull's admirable advocacy of surgical treatment in exophthalmic goître appears to be unnecessary, since the majority are agreed that at the present time better results are usually obtained by its means than by any plan of medical treatment. Our contention, however, is that surgical treatment is far from ideal, since it is not founded on sound physiological principles. Much useful work has been accomplished in connexion with the function of the thyreoid gland, as can be gathered from the article in question. Whether a full understanding of the pathology of exophthalmic goître will be the result of a continuation of this manner of inquiry remains to be seen. But even before the actual pathology is revealed, while it may be eminently desirable to treat the disease by removing the greater part of the thyreoid gland, the practitioner will do well if he endeavours to regard it as an obscure and complex disturbance of other tissues as well as of this gland of internal secretion. By careful observation and continued research a fuller knowledge of the disease process may be gained.—EDITOR.]

ERYTHRŒDEMA.

SIR: I am reporting a case of erythrœdema as I have not heard of similar cases occurring in Queensland.

Jean K., aged nine months, is a country child, reared on "Lactogen." She was over-fat for her age, but otherwise quite healthy until a month ago, when she had a short attack of broncho-pneumonia and convulsions. She was in hospital a few days and we noticed she would not use her hands and resented them being touched.

I saw her again yesterday and she had all the signs and symptoms of erythrœdema. She was carried whimpering into the surgery with her head bent on her chest and turned away from the light. Her hands and feet were very cold though it was a warm day and her hands were swollen and a peculiar deep pink colour as far as the wrists. Her mother said her feet had been similarly affected last week. Her skin was clammy and her gums red and swollen, but not ulcerated. She has cut four teeth in the last six weeks and two more are nearly through. Her mother said the child had been unbearably cross for three weeks and hardly sleeps at all. She will not sit on the floor nor attempt to crawl. She refuses all food except bread and butter and a few mouthfuls of milk, but sucked some raw steak eagerly. Her bowels are constipated and motions rather offensive, but look normal. She has lost a good deal of weight, but is still well nourished.

I would be glad of suggestions as to treatment.

Yours, etc.,

E. KENT HUGHES.

Kingaroy, Queensland,
May 17, 1924.

DEEP X-RAY THERAPY.

SIR: Upon his return from a trip abroad Sir Neville Howse is reported by the lay press to have declared that deep X-ray therapy is only effective in "small superficial lesions." At the time it was considered an inaccuracy on the part of his reporters, but the *Sydney Morning Herald* of May 1 last, extracts the following *inter alia* from a "speech on health questions":

"But in deep therapy, . . . although supporters of this treatment claim that it effects cures, the evidence I gathered in England showed that it is not considered to hold out even a reasonable prospect of prolonging life."

According to Sir Neville Howse, then, all the reported cases of cure of over five years' duration, now numbering hundreds if not thousands, in various parts of Europe and America of inoperable and recurrent cases of cancer, carried out in various institutions under the direction of the most distinguished experts in all departments of medicine with every possible assistance and with the best equipped laboratories *et cetera* are mistaken, that the diagnoses in the first instances are all wrong, that in fact the whole procedure is a humbug. Or it is possible that the various reported cases of lasting benefit in malignant lesions of brain, pituitary, pharynx, lungs, pancreas, uterus *et cetera* would be included in the designation, "small superficial lesions"?

Likewise with regard to the cases already described in your journal over a year ago, many of which are still well, as well as the patients exhibited at the Congress last year and submitted to the special sub-committee appointed for this purpose, are these all faked?

It is not claimed, of course, that deep X-ray therapy is a panacea for all cases of malignant disease. It has serious limitations just as much as surgical and other procedures, but nevertheless in selected cases it has immense advantages over all other methods of treatment at present available.

Yours, etc.,

H. FLECKER.

71, Collins Street, Melbourne,
May 5, 1924.

RECOVERY FROM SCLERODERMA.

SIR: The two cases of scleroderma reported by Dr. A. Holmes à Court in THE MEDICAL JOURNAL OF AUSTRALIA of April 5 remind me of the following:

A.R., employed in this Department as a boilermaker first came under my notice in October, 1906, when Resident

Medical Officer at Sydney Hospital. He was admitted with an erythematous scleroderma involving practically the whole of the body. Treatment as an in-patient for four months made no noticeable improvement in his condition.

When next seen in April, 1920, on account of an attack of appendicitis, the scleroderma had completely disappeared.

In conversation today he tells me that after discharge from the wards of Sydney Hospital he attended the Skin Out-Patient Department for about eighteen months and he estimates that the time between onset and complete disappearance was three years. He was absent from his work about twelve months. He is now, at the age of fifty-four years, a healthy-looking man with a normal skin.

Yours, etc.,

T. L. O'REILLY.

Railway Department, Sydney, N.S.W.,
May 23, 1924.

BIRTHDAY HONOURS.

IT is with much gratification that we can announce that His Majesty has been pleased to create Mr. Geroge Adlington Syme a Knight Commander of the Order of the British Empire. This distinction is a recognition of the extremely valuable services which he has rendered to the community not only in Victoria, but also throughout the whole Commonwealth. As Chairman of the Federal Committee of the British Medical Association in Australia, as President of the First Session of the Australasian Medical Congress (British Medical Association) and as a very eminent surgeon he is regarded as the leader of the medical profession in Australia. In congratulating Sir George and curselves, the remainder of the medical profession, we would express the hope that he may continue in good health and activity to enjoy the high esteem of his medical and non-medical contemporaries.

His Majesty has further been pleased to create Dr. John Ramsay, of Launceston, a Commander of the Order of the British Empire (Civil Division). Dr. Ramsay is President-Elect of the Tasmanian Branch of the British Medical Association and for many years was Medical Superintendent of the Launceston General Hospital. We tender our congratulations to him.

Books Received.

ELEMENTS OF SURGICAL DIAGNOSIS, by Sir Alfred Pearce Gould; Sixth Edition, Revised by Eric Pearce Gould, M.D., M.Ch. (Oxon.), F.R.C.S. (England); 1923. Sydney: Cassell and Company, Limited; Foolscap 8vo., pp. 750, with twenty radiographic plates.

DIPHTHERIA: ITS BACTERIOLOGY, PATHOLOGY AND IMMUNOLOGY, published by Eight Authors; Published in 1923 for the Medical Research Council of the Privy Council by His Majesty's Stationery Office at Edinburgh; Royal 8vo., pp. 544, with seven coloured plates. Price: 12s. 6d. net.

HISTORY OF THE GREAT WAR BASED ON OFFICIAL DOCUMENTS—MEDICAL SERVICES: MEDICAL HISTORY, in four volumes, by Major-General Sir W. G. Macpherson, K.C.M.G., C.B., LL.D.; Volume III.; 1924. London: His Majesty's Stationery Office; Demy 8vo., pp. 564, with sketch maps, charts, diagrams and illustrations. Price: Post free, 22s. net.

Medical Appointments.

DR. F. J. NIALL (B.M.A.) has been appointed Public Vaccinator at Hampton, Victoria.

* * * *

DR. L. F. FREEMANTLE has been appointed Junior Resident Medical Officer at the Perth Hospital.

Medical Appointments Vacant, etc.

FOR announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser," page xvi..

ALFRED HOSPITAL, MELBOURNE: Medical Vacancies.

Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, 429, Strand, London, W.C..

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 30 - 34, Elizabeth Street, Sydney.	Australian Natives' Association. Ashfield and District Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham Dispensary. Manchester Unity Oddfellows' Medical Institute, Elizabeth Street, Sydney. Marrickville United Friendly Societies' Dispensary. North Sydney United Friendly Societies. People's Prudential Benefit Society. Phœnix Mutual Provident Society.
VICTORIA: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association Proprietary, Limited Mutual National Provident Club. National Provident Association.
QUEENSLAND: Honorary Secretary, B. M. A. Building, Adelaide Street, Brisbane.	Brisbane United Friendly Society Institute. Stannary Hills Hospital.
SOUTH AUSTRALIA: Honorary Secretary, 12, North Terrace, Adelaide.	Contract Practice Appointments at Renmark. Contract Practice Appointments in South Australia.
WESTERN AUSTRALIA: Honorary Secretary, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.
NEW ZEALAND (WELLINGTON DIVISION): Honorary Secretary, Wellington.	Friendly Society Lodges, Wellington, New Zealand.

Diary for the Month.

JUNE 17.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
JUNE 18.—Victorian Branch, B.M.A.: Council.
JUNE 18.—Western Australian Branch, B.M.A.: Branch.
JUNE 18.—South Sydney Medical Association, New South Wales.
JUNE 24.—New South Wales Branch, B.M.A.: Medical Politics Committee: Organization and Science Committee.
JUNE 26.—New South Wales Branch, B.M.A.: Branch.
JUNE 26.—South Australian Branch, B.M.A.: Annual Meeting.
JUNE 27.—Queensland Branch, B.M.A.: Council.
JULY 1.—New South Wales Branch, B.M.A.: Council (Quarterly).
JULY 2.—Victorian Branch, B.M.A.: Branch.
JULY 4.—Queensland Branch, B.M.A.: Branch.
JULY 8.—New South Wales Branch, B.M.A.: Ethics Committee.
JULY 9.—Tasmanian Branch, B.M.A.: Branch.
JULY 9.—Melbourne Pædiatric Society.
JULY 9.—Central Northern Medical Association, New South Wales.
JULY 10.—New South Wales Branch, B.M.A.: Clinical Meeting.
JULY 10.—Brisbane Hospital for Sick Children: Clinical Meeting.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to "The Editor," THE MEDICAL JOURNAL OF AUSTRALIA, B.M.A. Building, 30-34, Elizabeth Street, Sydney. (Telephone: B. 4635.)

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